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November 1993

US Army Corps
of Engineers
Waterways Experiment
Station

Natural Resources Research Program

Proceedings, 18th Annual Meeting, Natural Resources Research Program

29-30 April 1993, Portland, Oregon

Prepared for Headquarters, U.S. Army Corps of Engineers

Natural Resources Research Program

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Final report

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Prepared for U.S. Army Corps of Engineers
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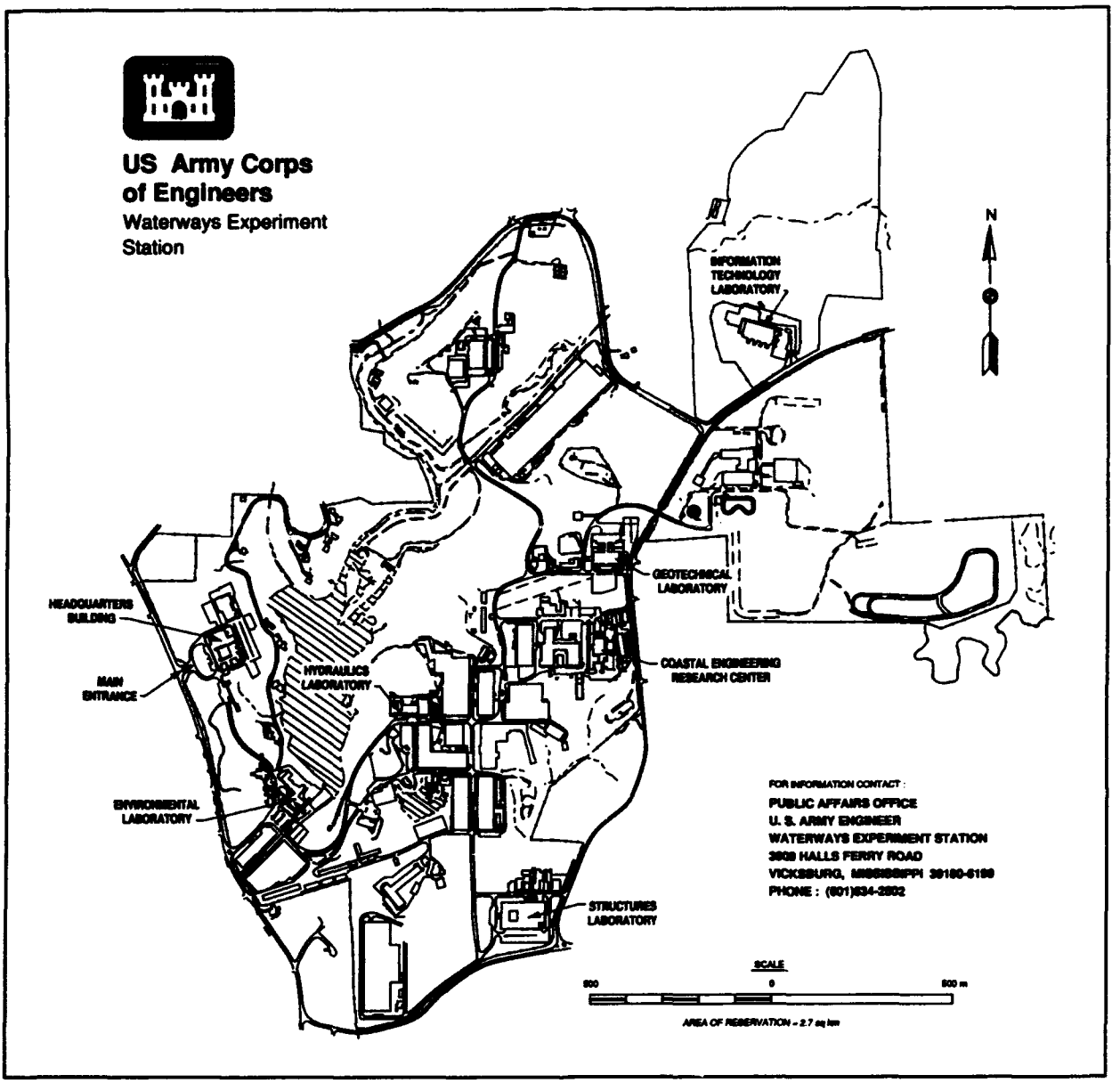

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PROPOSED WORK UNITS

FY94 CIVIL WORKS RESEARCH AND DEVELOPMENT PROGRAM REVIEW, NATURAL RESOURCES RESEARCH PROGRAM

Preface

The 18th Annual Meeting of the U.S. Army Corps of Engineers Natural Resources Research Program was conducted in Portland, OR, on 29-30 April 1993. The program review, required by the Directorate of Research and Development, was organized by personnel of the Natural Resources Research Program (NRRP), Environmental Laboratory (EL), U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, MS.

Presentations by WES personnel were prepared under the general supervision of Dr. John Harrison, Director, EL. Mr. J. L. Decell was Program Manager, NRRP. Ms. Judy Rice and Mr. Robert Daniel were Technical Monitors for the Headquarters, U.S. Army Corps of Engineers.

Ms. Carolyn B. Schneider, NRRP, assisted by Ms. Billie H. Skinner, Program Manager's Office, EL, coordinated the organizational activities of the meeting and efforts leading to the publication of this report.

At the time of publication of this report, Director of WES was Dr. Robert W. Whalin. Commander was COL Bruce K. Howard, EN.

Agenda

Thursday, 29 April 1993
McKenzie Room

8:00	Welcome - COL Charles Hines, Commander, USAE District, Portland
8:15	Announcements and General Comments - Carolyn Schneider, USAEWES
8:30	Invited Speaker - Charles Jordan, Director of the Bureau of Parks and Recreation for the City of Portland
9:00	Comments by the Technical Monitor - Judy Rice, HQUSACE
9:20	Comments from the NRM Branch - Dave Wahus, HQUSACE
9:40	Comments by the Manager, Environmental Resources Research and Assistance Programs - J. L. Decell, USAEWES
10:00	Break

Current Work Units

10:30	32744	Evaluation of Camping Trends at CE Projects - Sammy Franco, USAEWES
10:45	32728	Management of Water-Based Recreation Opportunities - John Titre, USAEWES
11:00	32745	Measuring the Effects of Recreation Fee Programs - Christopher White, USAEWES
11:15	32574	Regional Recreation Demand Model - Jim Henderson, USAEWES
11:30	32797	Effect of Reservoir Operations on Recreation Fisheries - Phil Kirk, USAEWES
11:45	Lunch	

Proposed Work Units

1:00	375-3	An Assessment of Recreation and Natural Resources Managed by the Corps of Engineers - R. Scott Jackson and Chester Martin, USAEWES

1:25	375-4	Techniques for Non-Federal Participation in CE Recreation and Natural Resources Management - Roger Hamilton, USAEWES
1:50	375-6	An Assessment of Fisheries Research Needs for CE - Phil Kirk, USAEWES
2:15	375-8	Identifying Nontraditional CE Project User Groups - Chris White, USAEWES
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3:00	Division/District Breakout Session, Moderated by NPD	
5:00	Adjourn	
5:30	Reception (cash bar) Klamath Room	

Friday, 30 April 1993
Willamette Room

FY94 Civil Works R&D Program Review

8:00	Report on Breakout Session - NPD Representative
8:30	Questions, Answers, and Discussion
11:30	Preparation and Submission of Input Forms
12:00	Adjourn FY94 Natural Resources Research Program Review

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Introduction

The annual meeting of the Corps of Engineers Natural Resources Research Program (NRRP) provides professional presentations of current research and discussions related to Corps activities and problems. In conjunction with this meeting, the Civil Works Research and Development Program Review is held. This review is attended by the Technical Monitors and representatives of the Civil Works Research and Development Directorate of the Headquarters, U.S. Army Corps of Engineers (HQUSACE); the Program Manager, NRRP; researchers; and representatives of the operations and planning elements of the Corps Division, District, and Project offices, including those designated as Field Review Group (FRG) members of the research program.

The overall objective of this annual meeting is to thoroughly review the Corps' natural resources/recreation needs and establish priorities for future research, such that identified needs are satisfied in a timely manner.

The technical findings of each research effort conducted under the NRRP are reported to the Manager, NRRP, U.S. Army Engineer Waterways Experiment Station, in the form of quarterly progress reports and as miscellaneous papers, instruction reports, and technical reports. The miscellaneous papers, instruction reports, and technical reports are distributed widely in order to transfer technology to both the operating elements and the technical community.

Technology transfer is also accomplished through the Natural Resources Technical Support Program (NRTS), through the publication of the information exchange bulletin *RECNOTES*, and the conduct of workshops. Upon request, NRTS provides direct assistance to the operating elements and the HQUSACE regarding problems that need application of technology.

The printed proceedings of the annual meetings and program review are intended to provide Corps management and the FRG with an annual summary to ensure that the research is being properly focused on the Corps' operational needs nationwide.

The contents of this report include the presentations and discussions of the 18th Annual Meeting, held in Portland, OR, on 29-30 April 1993.

Featured Speaker—Charles R. Jordan

Mr. Charles R. Jordan, Director, Parks and Recreation Department, Portland, OR, was the featured speaker for the Natural Resources Research Program.

Mr. Jordan has devoted his professional life to public service and is recognized both for his leadership and responsiveness to the diverse publics he serves.

Mr. Jordan has initiated and implemented successful programs in the areas of parks and recreation, human resources, public safety, neighborhood organizations, environment, among others.

With a long-standing involvement in parks and recreation issues, Mr. Jordan now directs one of the nation's leading parks and recreation programs, and brings to that job a perspective to parks that has been described as insightful, provocative, refreshing, bold, and visionary.

Mr. Jordan served as Assistant City Manager of Palm Springs, CA, City Council Member in Portland, OR, where he was Fire Commissioner for 2 years, Police Commissioner for 5 years, and Parks Commissioner for 3 years. He served as Director of Parks and Recreation in Austin, TX, before moving to his current position as Director of Parks and Recreation for Portland, OR.

Mr. Jordan's publications include the following:

- "Diversification, Minorities and the Mainstream Environmental Movement," *Voices from the Environment Movement: Perspective for a New Era,* 1992, Island Press.
- "More than Fun and Games," *The Benefits of Leisure*, Venture Publishing, Inc., State College, PA, 1991.
- "Minorities in Conservation: An Uphill Battle," *Earthworks*, April 1991.
- Numerous articles on Minorities and the Ecological Movement.

Comments from Natural Resources Management Branch, HQUSACE

by
Judy Rice[1]

Good morning. The first thing I would like to do is thank Mr. Jordan for taking time out from what I know is a very busy schedule to talk to us this morning. Darrell [Lewis] asked me to convey his regrets that he could not be here today to hear Mr. Jordan speak and also to relay his opinion that the most important concept on the horizon for the recreation profession is the benefits-based management approach. We are very fortunate to have the opportunity to hear someone as distinguished and knowledgeable as Mr. Jordan speak about this concept, and particularly in this forum—the annual meeting for our research program—where we are looking towards research to support our Natural Resources Program for the future. Thank you again, Mr. Jordan.

And my thanks also to the North Pacific Division for hosting our meeting this year. We are a relatively high maintenance group. We've had most of the Division and District staff mobilized this week, attending meetings and giving project tours. You will probably see a big jump in the visitation to the Bonneville project for the month of April.

Now, usually at the program review, I sort of summarize what we have accomplished in the Natural Resources Research Program (NRRP) since our last meeting. And, we have accomplished a lot again this year. We have continued to refine our economic impact assessment capability, and we have begun to transfer to the field the capability to do their own economic impact evaluations. We have begun the conversion of the campground receipt study to allow the field to analyze their own data in the way and at the time they need it. We have a draft report that should be out soon on measuring dispersed visitation. We have instituted an Automated Use Permit System (AUPS) bulletin board to improve technical support to AUPS users. And, we've made good progress on our ongoing work units. But, I'm going to let Lewis [Decell] and the Principal Investigators talk more in depth about these accomplishments a little later. The main thing I would like do this morning is give something of a report on the progress of the NRRP Strategy Task Force.

Last year at program review, we announced—with some fanfare—the establishment of the NRRP Strategy Task Force. The task force was charged with engaging in strategic planning for the future of the NRRP for the purpose of (a) identifying major trends in the recreation and natural resource environment which will impact on Corps projects; (b) determining focus areas for future research to ensure adequate agency insight and available technologies to accommodate those trends; and (c) identifying effective avenues for technology transfer, both within and outside the agency.

Task force members were Susan Whittington, South Atlantic Division; Don Dunwoody, Missouri River Division; Mike Ensch, Southwestern Division; Jim Shiner, John W. Flannagan Lake, Huntington District; Andy Anderson, U.S. Army Engineeer Waterways Experiment Station (WES), as chair; and myself. When Andy retired, Lewis Decell took his place as the WES representative, and I became the chair.

We told you we expected to complete our work and have a report to you by July. We lied. In May, we received direction from the Assistant Secretary of the Army to conduct the recreation policy review. Since some of

[1] NRRP Technical Monitor, Natural Resources Management Branch.

the task force members were doing double duty on the recreation review, and since we expected that the recreation policy review might change our Natural Resources Management (NRM) program direction to some unknown degree, we temporarily suspended the task force work. But, we reconvened last month for a final, wrap-up session, and—although I don't have a final or even a draft written report to give you—I would like to briefly describe for you the task force recommendations. Please keep in mind, of course, that these are just the task force preliminary recommendations—and like any Headquarters (HQs)-sponsored task force product—they must be reviewed and accepted by HQs before they become final.

The first thing we wrestled with was the need for a mission statement. We thought it difficult to direct the research program in support of the NRM program without stating what the NRM program is. Since we don't have an approved mission statement, we decided to adopt a "background" statement for the purposes of the task force work. That statement is as follows:

> The U.S. Army Corps of Engineers Natural Resources Management Program manages, conserves and improves natural resources and the environment while providing quality outdoor recreation to serve the needs of present and future generations.

Next, we developed a statement of purpose for the NRRP to help us focus our thinking for the task force. That statement is as follows:

> The NRRP develops and provides improved methods and techniques addressing issues of significant importance and scope in support of the Corps of Engineers nationwide recreation and natural resources program.

Then, we brainstormed some assumptions about the NRM program, (i.e., we have a finite land base, we can expect to see stable or decreasing resources in terms of dollars and manpower, increasing emphasis on environmental issues, etc.) From those assumptions, we identified a number of issues that we believed would impact on the NRM program in the future. This was also a brainstorm kind of effort, and we asked a number of you to help us fill out and refine that list. These "emerging issues" we grouped into categories. Those categories are as follows:

- Changes in demographics and customer profiles.
- Changes in demand/use for land and water resources.
- External demands on project resources.
- Environmental considerations.
- Changing approach to management of natural resources.
- Fiscal constraints.
- Water issues.
- Archeological, historical, and cultural awareness.
- User-oriented communication/interaction.
- Approaches to partnering.
- Aging infrastructure.
- Changing role of managers and natural resources staff.
- Increasing importance of identifying and communicating the Corps role in NRM.

So, these were the things we thought would impact our projects in the coming years. That satisfied the first part of our task force charge. The next step was to identify research focus which addressed these issue areas and which might lead us to a decision about where we should be directing our research attention. These focus areas became as follows:

- Management systems/techniques.
- Policy effectiveness.
- Social implications/trends.

- Economic effects.
- Environmental considerations.
- Physical facilities/design.
- Natural resources.

I've given you all these lists here, and you're probably saying, "Now what relates to what?" But, it was a distillation process. Assumptions led to issues, which led to issue areas, which led to focus areas. The intent was to give us a structure for thinking about potential research topics. What do we as NRM managers need help with and how can research give us that help. So, this product satisfied the second part of our task force charge.

The group decided that this was all well and good, but that we needed to identify those areas that were most important to us in the near term, so we could effectively direct our resources and focus our attention to those areas. In order to do that, we went back to the issue areas and decided that the following three areas deserved primary emphasis.

- Changes in demand and customer profiles.
- Changes in demand/use for land and water resources.
- Increasing importance of identifying and communicating the Corps role in NRM.

The first two emphasis areas require baseline data and longitudinal monitoring. We know something about who our customers are and what they want; we need to find out who they might be in the future and what demands they might make in coming years. The last emphasis area recognizes that we can't continue to attempt to do everything for everyone. We have to determine what our niche is in natural resources and recreation management, based upon our available resources and public demand. Then, we must communicate that information both within and outside the agency.

OK, so the next question becomes "So what? What is all this good for? How do we use this strategy?"

As I said, we intend to use this as a structure or a guide for looking at the research program. As ideas for research work units surface, they will be evaluated in terms of the research focus areas and the primary emphasis areas. A research topic falling within more than one focus area probably has broader application to the program and is probably a stronger candidate for research effort. A topic falling within one of the three emphasis areas is timely and should receive strong consideration.

The task force is also considering a recommendation that WES develop a 5-year Research and Development (R&D) plan for the NRRP, to take the next step in operationalizing this strategy. The 5-year plan will provide specifics for identifying and conducting research in accordance with our strategy. Lewis has done this for some of his other programs, with a good deal of success, and we feel that such a plan would be of assistance to us, as well.

One chapter of the task force report will deal with implementation. We are planning to incorporate a detailed plan for getting research ideas into the system and getting them reviewed and evaluated, in accordance with this strategy. We have some outlines—a flowchart, if you will—for getting everyone involved, but it's not ready for prime time yet. We are looking at some kind of midyear Field Review Group review—maybe a meeting, maybe a teleconference, maybe just a written review—of proposed work units to determine which are the strongest for formal presentation at the annual program review.

The last element of our task force charge dealt with information sharing or technology transfer, both within and outside the agency. We will treat the technology transfer aspect of the task force charge somewhat lightly. It proved to be a bigger task than we could

realistically address with this group, but we will have some recommendations for future work in this area. There are some databases available that managers at each level can access for information about who is doing what research in a particular area. We will look at ways to facilitate that kind of communication and information exchange.

In general, if you look at our research program over the course of the last several years, you will find that the work is starting to coalesce. The work units are interrelated, and the output from one may be used as input to several others. We are developing a research "program," rather than a collection of research work units, as Lewis says. I think the results of the strategy task force will help strengthen that program identity—as well as strengthen our argument for funding for our program. As John Elmore goes into the Civil Works R&D Committee meeting each year, where they divvy up dollars for programs—if we can give him a research program supported by this strategy which makes the working connection between the NRM and the NRRP and if that program is described and supported in a 5-year research plan—we will have given him the ammunition he needs to fight for us.

As you listen to the presentations today, I think you will find that the work units fit nicely into this structure. I think WES has done a good job of listening to our folks and then describing some research to address some of the problems.

What I wanted to do this morning was briefly outline the strategy for you, so you can be somewhat familiar with it and maybe think about the proposed, as well as ongoing, work units in these terms. Once the strategy report has been finalized and approved, it will be released for general field distribution. Periodically thereafter, it will be reviewed and updated as necessary to ensure that it remains current, relevant, and usable.

Thank you.

Comments from Natural Resources Management Branch, HQUSACE

by
Robert Daniel[1]

1. Existing Infrastructure—You are managing. What is best? And question is "How to determine?"
2. Benefit/cost (BC) analysis is a tool that is useful for the following:
   a. Forcing identification of outputs (benefits).
   b. Mechanism for tradeoff between/within programs.
   c. Requires a common measure (usually dollars).
3. Misunderstanding is rampant; earlier speaker said:
   a. Need to identify benefits—(GOOD).
   b. Need to replace building because it is falling down, then we will measure the benefits—(WRONG).
   (1) Building replacement should be easily justified if it is providing valuable output and is in fact falling down.
   (2) Building replacement may in fact be counter productive because it is not useful, it is not the best investment, and/or it precludes the best investment because of a budget constraint.

   Use the tool, do not let it use you!
4. Objectives and Goals—Need to be careful in specification; specify what is best or optimal and how it is to be measured.
   a. If object is to "Increase Use," then you use cost effectiveness, not B/C. But an objective of "Increase Use" begs the question of how you specified the objective.
   b. Further "Increase Use" is a terrible objective—At what costs? What are the benefits?
5. Benefits—do not have to be in dollars; but when they are not, tradeoff is difficult.
6. Need to get rid of the "Our Program" mentality; there is only one Corps Civil Works program; there is not an Operations program, Engineering program, Planning...etc.
7. Dinosaurs on our staff (or in Corps); they are us!
   a. I believe that if you are candid, your reward will be spiritual—Mr. Jordan talked about looking in the mirror.
   b. You will not be rewarded here because 98 percent believe "we have always done it this way, ergo ...."
8. Field review groups can make a difference, but they need to bring ideas to the table.

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[1] NRRP Technical Monitor, Natural Resources Management Branch.

Comments from Natural Resources Management Branch, HQUSACE

by
Dave Wahus[1]

My purpose this morning is to review the roles of a three-part team involved in the Natural Resources Research Program and the responsibilities of each. As we experience changes in the Corps and turnovers in personnel, I have heard concerns expressed that we may not all understand what is expected of us in the Natural Resources Research Program.

The overall manager of the Civil Works Research and Development (R&D) Program is the Directorate of Research and Development. Additional support, coordination, and review are provided by proponents, technical monitors, and field review groups. The R&D is performed at the laboratories.

The Civil Works R&D Program is made up of three parts:

- Field Review Group—Division/District representatives.
- Research Arm—U.S. Army Engineer Waterways Experiment Station (WES).
- Headquarters—
  - * The overall manager is Jesse Pfeiffer (Mark Dortch is representing him here today).
  - * Technical Monitors—Judy Rice and Bob Daniel.

The first part and perhaps the most important part of the three parts is the Field Review Group. The Field Review Group (FRG) is a group of field personnel who act as consultants to the Technical Monitor, Program Manager, and the Directorate of R&D for a research program. Their responsibilities include the following:

- Assist in timely technology transfer of R&D results.
- Attend and participate in annual program reviews.
- Assist the Program Manager and Technical Monitor in establishing priorities.
- Assist in proposing new research items/ area.
- Assist in identifying and coordinating field demonstration opportunities for R&D products.
- Actively represent operations and planning.

Membership in the FRG is recommended by the Technical Monitor and approved by the Directorate of Civil Works and the Directorate of R&D.

The FRG acts as consultant to the Technical Monitor, the Program Manager, and Directorate of R&D. The research program belongs to the field, and the majority of "researchable" problems are usually identified at project level.

Research cannot directly solve operational problems. Research provides us with the capability to solve our own problems. The FRG is responsible for obtaining comments from other interested elements in your commands regarding the priorityof the work units and/or the need for modification of the work units to assist them in accomplishing their programs.

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[1] Natural Resources Management Branch, HQUSACE.

FRG should continually provide input, communicate with the field they represent throughout the year, and identify problems they have no capability to solve. The FRG should come to program review meetings prepared to represent the field's needs rather than just come and react to what is presented. The Civil Works R&D program rests on problems defined outside the laboratory. The FRG is the source of identifying needs (write, speak, anyway—anytime). The FRG also has the responsibility for identifying what the product should be, how it will be used, and how to get to the end product you ultimately want.

How many of you share the list of work units under consideration with your subordinate elements and ask for their input prior to attending the program review? How many of you provide feedback to your subordinate elements after the program review? How many of you make research (NRRP) a regular issue during your discussion with subordinate elements?

The second part is the Research Arm. The Research Arm, WES, manages the Natural Resources Research Program (NRRP). The Program Manager is responsible for the following:

- Managing the R&D program to ensure technical quality, efficient resource utilization, timely execution, and responsiveness to research needs.
- Recommending initial priorities and funding levels of work units in consultation with the Technical Monitor and the FRG.
- Identifying needs for redirection of R&D effort and coordinating with the Technical Monitor prior to implementation.

In short, this means developing work units based on field input. WES proposes a draft R&D program based on their understanding of the problems. This is the basis for the beginning of a detailed discussion that culminates at the annual program review. The work units are then modified based on comments and prioritized according to the FRG vote. Then the Research Arm makes recommendations that reflect field input.

The responsibility for execution of the approved R&D program is delegated to the performing element, which in our case is WES.

The third part is the Headquarters. The Headquarters has two parts: the Directorate of R&D and the Technical Monitor.

The Directorate of R&D facilitates this whole process to keep things going. Program reviews are conducted by the Directorate of R&D. The program reviews determine, in detail, the recommended R&D work units, needs, priorities, and budget for each research program for the budget year and establish the proposed work units, requirements, justifications, and priorities for each research program for the budget year plus the following year.

The Technical Monitors (Judy Rice and Bob Daniel) are responsible for the following:

- Recommending final priorities and funding levels of work units after consultation with the Program Manager, the FRG, and the functional chief.
- Recommending approval of new R&D work units and their relative priority.
- Monitoring progress to ensure responsiveness to user problems through technical dialogue with the performing element.
- Identifying need for redirection of R&D and initiating appropriate action through the Program Manager.
- Ensuring that R&D results of high technical quality are useable and amenable to technology transfer.
- Working closely with the Program Manager, the FRG, and the R&D Directorate.
- Providing oversight.
- Ensuring that the NRRP addresses the field's needs.

- Receiving, considering, and acting (approving/disapproving) on recommendations of the Program Manager.
- Monitoring the program during execution to ensure conformance to the approved work unit plans.

This three-level approach makes this program go. All must do their own part. If one arm fails to do their part, that failure affects the entire program. Everyone must be open, and honest communication is a must at all times.

There is no R&D budget. Instead a piece of General Expense, Construction General (CG), Operations and Maintenance (O&M), and General Investigations (GI) budgets goes for R&D. Most of it comes from GI and O&M. Only one item (Aquatic Plant Control) comes from CG.

The Director of Civil Works and the Civil Works Division Chiefs make the final determination on the composition of the overall Civil Works R&D program. This meeting is your opportunity to voice your concerns and identify those areas that need research. Don't go home and complain about the NRRP if you don't voice your concerns here first.

You should also be interested in the Environmental Impact Research Program (EIRP) and the Wetlands Research Program. Get to know your EIRP and wetlands representatives [handout list of EIRP FRG].

If you believe in research, and I think you do, it is our job to make our research program effective.

Recent Developments in Campground Receipt Study Data Collection

by
Sammy Franco[1]

Introduction

The purpose of this paper is to describe the status of an ongoing longitudinal study that has gathered descriptive statistics on camping from representative Corps projects. Application of an ongoing database resulting in trends contains many strengths and weaknesses. Since a trend refers to the systematic observance of something over time, analysis can be hampered by the lack of comparability of survey questions and sampling methods. Additional limitations include a lack of standard definitions for measuring social indicators and differences in the level of detail for gathered data. To ensure reliability, a database should contain data collected over a period of time long enough to avoid cycles while accounting for short-term variations.

Campground Receipt Study

Through the Campground Receipt Study (CRS), a database has been developed on one of the Corps' most popular activities: camping. The CRS has undergone continual development and evolution since the study program began. Variables that have been measured include parties with prior visits to the project; camping parties with the project as their primary destination; and camping parties with vans, cars, motorhomes, trucks, tents, pop-up trailers, pickup campers, travel trailers, and powerboats. An examination of variables, such as the use of electrical hookups, can assist managers in planning for visitor preferences. Additional uses of CRS could include an examination of occupancy rates. Occupancy rates have been used as key indicators of economic viability in the hotel-motel industry for some time.

The recent availability of computer technology at the field level has dramatically changed the possibilities regarding data entry and retrieval for analysis and reporting of campground information. The development of the Automated Use Permit System (AUPS) is an advancement in the direction of computer-aided management information systems. The AUPS was designed to incorporate the data requirements of the CRS so that any Corps project utilizing AUPS can collect CRS data. CRS-related questions are displayed by AUPS according to whether a program "switch" is set. This capability eliminates the time spent in keypunching and error checking and provides some onsite data-analysis capability.

New Software Program

Prior to 1993, field-level personnel could use dBase software to generate reports on variables such as site occupancy, average length of stay, Zip Codes, average group size, and number of golden age permit holders. AUPS provides data the managers can review to resolve problems in a timely manner or to improve the efficiency of operating and maintaining campgrounds. These data are useful to landscape architects and planners when examining future recreation area designs.

During fiscal year 1993, CRS will be taking a dramatic turn. The U.S. Army Engineer Waterways Experiment Station (WES) will no longer be producing the "Summary of the Campground Receipt Study." A new exportable trend analysis software is being developed. This new software program will be distributed to all AUPS projects. This program will start with analysis of data that is in the current

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[1] U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

reports. After a few simple questions are answered, a menu selection will allow for trend analysis by recreation area for any set of dates. This will enable managers to do recreation area trend analysis as needed instead of waiting for the yearly report form WES. The major benefits to using the new computer software are as follows: with over 130 projects currently using AUPS, a faster turnaround than previous approach; analysis can be performed on any set of dates; analysis can be incorporated into management activities; retention of data still supports development of national trends; and data still available for related work units. Managers will be canvassed to identify other information needs for future analysis.

Summary and Conclusions

Investment in the CRS effort is paying dividends of continual development. CRS, aided by AUPS, is approaching a situation in which project managers and District personnel can make decisions rapidly that reflect on-the-ground changes in the use of Corps recreation areas. This AUPS/CRS combined system will allow the Corps to improve overall efficiency and address current problems by giving resource managers better control over a constantly changing environment.

Pilot Test Results of Two Recreational Carrying Capacity Procedures for Improved Management of Water-Based Recreation Opportunities

by
John Titre[1]

Introduction

The second year of the work unit dealing with the management of water-based recreation opportunities focused on adapting existing land-based carrying capacity procedures to lake environments. In the process of working primarily with the Pittsburgh District on the testing of two procedures, considerable knowledge was gained that advanced the work unit and provided field input to suggest future directions. This paper is based on four major meetings that were held over the course of a year in Pittsburgh District and Project offices. The purpose of each meeting served to gauge management reaction to phases of the procedures during the process of their application. Criteria for evaluation were consistent with the objective of developing a low-cost manager-oriented Corps procedure for dealing with problems of increased use and associated conflicts outlined in the Scope of Work for the work unit. The purpose of this paper is to report on the field input obtained during those meetings relevant to the continued success and usefulness of the work unit.

Pittsburgh District Pilot Test

During the initial meetings with the Pittsburgh District as well as other Corps of Engineers (CE) offices, it was necessary to establish an understanding of carrying capacity concepts derived from the literature review produced during the first year. Carrying capacity is defined as "the type and level of visitor use that can be accommodated while sustaining the desired resource and social conditions that compliment the purposes of the park units and their management objectives" (U.S. Department of the Interior 1993). This definition focuses on specifying the resource conditions necessary to meet the desired needs of boaters. It places less emphasis on space standards as determined by merely accounting for the number of boats on the water at any given time. For example, during our pilot test, an accident occurred between a personal water craft and a runabout under conditions of low density. The quality of the experience for both users was obviously diminished by this unfortunate accident; however, ranger reports indicated that it was not attributed to the number of crafts on the water. This example dispels the myth that more boats on the water suggests more accidents *and lower visitor quality. Dissatisfaction with* the experience and potential accidents may have more in common with user types and locations for boating than numbers alone. Furthermore, the cause and effect relation between density and quality has resulted in weak empirical findings (Manning 1985). Consequently, greater emphasis should be placed on objectives for the kinds of experiences to be provided for at various locations on the lake.

This incident led us to elaborate on five myths commonly associated with managing for "optimal" carrying capacity. First, improved quality means higher costs. Improving quality should result in lower costs as evidenced by fewer complaints, less patrols, and fewer rehabilitation efforts of control overuse. Second, carrying capacity studies are only for those lakes that managers already consider too crowded. It is important not to wait for a crisis to start a study. Habits become set in

[1] U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

concrete and are often difficult to change. Obtaining information on public perceptions should be a regular part of doing business. Third, each lake has a carrying capacity that we can manage for. It should be evident from the accident in the previous paragraph that a single number for a lake beyond which accidents or other problems occur is unrealistic. Computing acres/boat provides a crude ballpark figure that should be used in conjunction with other information. Fourth, management of boating use is a state problem. Typical authority at CE lakes is splintered related to boating use. Smaller lakes have as high as a 5 to 1 ratio of other government to CE employees assigned responsibility to a lake. The states enforce boating laws that may vary somewhat among other states. The CE has the greatest responsibility for allocation issues as they relate to access. Most important is the fact that the CE in almost every situation has the most current management document, typically an operational management plan, to assist in boating-related decision making. The key is to establish research partnerships between states and CE Districts to create an ownership in the process and a commitment toward applying the results together. Fifth, the system will adjust itself. If people don't like the experience at one lake, they can go to another nearby lake. When this occurs, managers feel as though they have fallen on their responsibilities. We do not manage restaurants. Instead, our challenge is to facilitate opportunities for a diversity of people to enjoy water-based recreation in settings that contrast their daily lives. While all lakes cannot and should not be all things to all people, each lake should attempt to chart its future by maintaining choices for people that cover a spectrum of conditions in contrast to a "take it or leave it" single experience. We suggest these myths as useful responses during future meetings to dispel misconceptions that often surface especially when working with individuals having less exposure to recreation management.

Based on the above discussion of the misconceptions, "What is the aim of carrying capacity studies?" The purpose of carrying capacity determination is to maintain and improve the quality of recreation. The key words *maintain* and *improve* quality were mentioned during the address provided by Judy Rice (Headquarters) in her comments reporting on the task force objectives for future recreation research topics. To discuss quality in further depth implies facilitating opportunities that meet the diversity of visitor needs. *Diversity* becomes the third key word essential to understanding carrying capacity concepts.

Maintaining and improving diverse quality experiences is dependent on solid information about how boaters use the lake and the conditions they desire. Obtaining this type of information requires going to the people and asking them what they are looking for. However, the task of obtaining this information is only a job half done. Managers must decide on which types of opportunities should be provided. Manning (1986) feels that "judgements... should be an explicit and visible part of a systematic and well documented planning process." In addition to gathering the information, the role of research is to discuss with managers the possible consequences of particular management actions.

For those who would like further information on recreation management, we suggest reading selected chapters (especially Chapter 9) from Manning's book (1986) that outlines what researchers have learned over the past 10 years about recreation behavior. His four-step planning process lists determining management objectives as the second step. Our experience with the Pittsburgh District indicated that writing objectives prior to examining existing information about use is often frustrating. The process that we have selected approaches objectives as a product in a later step once information is gathered. This does not imply that data collection begins with no goals in mind. On the contrary, a consensus is reached concerning achieving quality user experiences. This is really all that is needed at this point. Unless a careful inventory is conducted that reveals how people are using the lake, it is difficult to decide on how they should be using the lake, the amount of use, where and when, etc. This is analogous to

orienting yourself on a map to determine where you are before deciding where to go next.

Quality Upgrading and Learning (QUAL) Selected as Most Useful Procedure

During the final meetings with the Pittsburgh District, the QUAL process applied to Youghiogheny Lake was considered the most useful of the two procedures tested. The use of modified open-ended questions that seem to capture information critical to management decisions was superior to predetermined scaled questions used in other procedures. Improving quality implies a direct accounting of what users are looking for and the problems they perceive. QUAL seems to achieve this important management need. Managers felt that they could apply the information to decisions and understand the process from start to finish. Furthermore, the "scaled questions procedure," which is similar to many other more academic procedures, tends to focus on the assessment of crowding lake-wide versus specifying quality conditions for locations and user groups. Approaching recreation use as habitat conditions to be managed for requires a more thorough development of information critical to recreation species success borne out of open-ended responses. To state that the lake is moderately crowded as the empirical result of a scaled question leaves little information for the manager to use in devising management strategies. To conclude that the lake has been shown to be scientifically considered more or less crowded left area and project managers saying "So what." Such information leaves very little hard data about where to go from here. Managing for quality requires information about improving quality. QUAL seems to achieve this better than any other system reviewed or tested.

Steps in the QUAL process are as follows:

- **Step 1.** Management Goal: Quality Recreation.
- **Step 2.** Inventory Existing Conditions (Conduct surveys).
- **Step 3.** Analysis of Alternatives.
- **Step 4.** Objective Setting and Implementation.
- **Step 5.** Monitoring and Evaluation.

Key Aspects of the QUAL Pilot Test Success

Several features were important to the overall success of the pilot test. First, it was very valuable to position an individual onsite 2 months prior to conducting the actual surveys. This allowed us to clearly define the management issues as well as identify locations for interviewing. Sampling depends upon a thorough accounting of all possible access locations. These locations can then be grouped into appropriate strata for allocation of labor necessary to collect the samples. Another aspect of spending 2 months with the management staff prior to data collection is the added benefit of gaining a better understanding of how the whole management situation works. Much of this information in intangible. It can be compared to visiting as a tourist versus living there as a resident. A tourist leaves with mental snapshots and less of a full picture of the people and events that involve lake management. A 2-month tour is the minimum time required to acquire the resident perception.

Second, a news release was provided to local newspapers prior to data collection. This proved to be a valuable decision that probably helped to avoid many unforeseen eventualities. Where a news release was not done prior to data collection, calls to the project manager about the study once it began could have been avoided.

Third, at Youghiogheny Lake, rangers and volunteers were used to assist in the data collection. This allowed the resident researcher who functioned as a management information specialist to oversee data collection, input, and initial report writing. This is also an important aspect of quality data control. Often, errors in social science data collection are encountered early in the study as interviewers

become accustomed to the survey and recording the data.

Fourth, bi-weekly management information bulletins were produced as the data were analyzed. These are two-page reports that highlight interesting and important information as it is gathered. Although only 40 percent of the data may have been reported, patterns tend to remain fairly consistent when 100 percent of the data are fully analyzed. Managers at Youghiogheny Lake actually used the data to direct boat patrols based on the time of the day and the location of boating traffic.

The management information bulletin will allow the project staff to prepare a Public Information Bulletin written in layman language that shares important aspects of the study while informing the general public about lake management. This four- to five-page bulletin or pamphlet could also be distributed at the visitor information desk and at open house meetings. This completes the loop in terms of reporting the data for the purposes of improved management. A manager remarked that his interest is greater in the process to achieve this final bulletin than the finding that it might contain. Letting the public know that we are sincere about gathering the necessary information to better manage the lakes entrusted to our care carries us a long way toward improving our public image. Information will improve as a commitment is made by the management staff to embark on such a journey.

Management Information Systems and QUAL

Producing the management information bulletin is part of a larger process to funnel information to appropriate decision makers. The business community has long recognized the importance of inventory information to improve decision making. Management information systems (MIS) can assist recreation managers to better organize, store, and transmit gathered data to appropriate levels for decision making. Also, by integrating data collection efforts from other sources such as the Visitation Estimation and Reporting System (VERS), the Automated Use Permit System (AUPS), and the Natural Resource Management System (NMRS), the total information package can more efficiently answer pressing management questions.

MIS and Geographic Information Systems (GIS)

Geographic information systems (GIS) can be viewed as a subset of MIS. It is likely that MIS/GIS will become the standard information organizer for decision making. This finding was recognized early in this work unit. GIS software was purchased to specifically meet the objectives of low-cost easy-to-implement systems. IDRISI, developed at Clark University, was successfully used to enter and store spatial data to produce maps and a 5-min video on boating use for Youghiogheny Lake. A model is being developed that outlines how data can be funneled to improve decision making using MIS/GIS concepts. Expert systems are also being evaluated as a means to assist managers in working through a process of deciding on the kinds of information needed for appropriate decisions. Future directions in this area will continue to enhance usefulness of this work unit and improve the overall efficiency of data collection, storage, and reporting.

References

Manning, R. E. (1986). *Studies in outdoor recreation*. Oregon State University Press, Corvallis, OR.

U.S. Department of Interior. (1993). "Visitor experience and resource protection planning process," National Park Service, Denver Service Center, Denver, CO.

Measuring the Effects of Recreation Fee Programs

by
Christopher M. White[1]

This past year several background documents were completed concerning the Natural Resources Research Program (NRRP) research unit. A comprehensive bibliography about fees for outdoor recreation was completed. This was the first time that such information had been collected and published in one document. Also, a comprehensive legislative history of fees for outdoor recreation was completed. This was a joint effort with the Congressional Research Service (CRS), and the final product was a document published by CRS, with the information also sent out on Corpsmail. This legislative history was a year-by-year breakout of the changes to fee legislation. A more general article was published in *RECNOTES* that summarized major points related to the legislative history of fees.

Pilot Study

In addition, the results of a pilot test were prepared for publication as a technical report. Three Corps of Engineers projects in Texas (Lake Georgetown, Lake Whitney, and Lake Lavon) were selected for the pilot study. Respondents at day-use recreation areas with beaches, picnic tables, and boat launches that had the potential to be fee areas were queried concerning perceptions of fees and perception of area quality; willingness-to-pay under different fee scenarios; and the importance and performance of 19 common facilities, services, and amenities.

Overall, visitors to these Corps sites were evenly divided in their support and opposition to fees. Respondents indicated the greatest support for fees if the fees stay in the area where they are collected. There was also strong support for fees that were higher for better quality areas (73 percent either strongly or mildly agreeing). Of the different fee alternatives tested in the analysis, an entrance fee without restricted pass has the largest percentage impact on visitation; and an annual pass for $12 has the smallest percentage impact on visitation. Revenue could be optimized in an entrance-fee-without-restricted-pass scenario.

Concerning site qualities—clean restrooms, shaded picnic sites, clear water, and adequate parking were most important to visitors. At the same time, clean restrooms and clear water were ranked relatively low in actual performance. This may indicate that mangers intending to impose day-use fees should consider upgrading these amenities and then emphasizing this upgrading to increase public acceptance of day-use fees.

Addition of Marketing Study

An additional section was added to the NRRP work unit at the request of the Headquarters, U.S. Army Corps of Engineers (HQUSACE). This is being funded by the National Resources Technical Support and relates to the 1990 Corps of Engineers Recreation Study recommendation I(b) of that report: "Conduct further marketing and demand studies to determine what additional fees would be feasible and at what level" (p. 131). The discussion of that recommendation expands on that statement:

> **Marketing Studies and Demand Analyses.** Approaches to reducing the Federal burden of the Corps recreation program include increasing revenues generated by existing recreation opportunities and broadening the program to provide new opportunities, either by the Corps or by increasing

[1] U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

non-Federal public or private management. In all cases, this requires an understanding of the motivations, preferences and needs of both existing users, who might be impacted by management changes, and potential customers not now served [emphasis added]...and [referring to working with other agencies] in order to exploit these opportunities when they exist, standard survey questions should be developed to collect activity, preference, motivation, and other such data [emphasis added] to support market analyses. [p. 120].

Initiation of Fee Survey

Therefore, the scope of the fee study was expanded to "examine and observe social-based and economic variables influencing perceptions of fees at Corps recreation areas to provide a more complete understanding for Corps personnel whose responsibilities include any aspect of fees." This is being done through administering a campground and day-use survey at six Corps sites across the country. These sites were selected to represent a variety of sites and conditions based on representativeness, sampling and survey design considerations, and project characteristics. The final six sites selected are Burnsville Lake (Huntington District), Strom Thurmond Lake (Savannah District), J. Percy Priest Lake (Nashville District), Truman Lake (Kansas City District), Canyon Lake (Fort Worth District), and Lake Mendocino (Sacramento District).

The surveys being used at the above sites are some of the few which address public sector fee issues from both an economic and psychological perspective. Some of the data from the survey questions will be used in both the NRRP Work Unit and the Demand and Marketing Study. However, each will be assessed and analyzed from either an economic or a psychological perspective. Recent literature suggests that this is a useful and forward-looking approach. *Amenity Resource Valuation: Integrating Economics with Other Disciplines*[1] suggests the following: "While economists have been developing theoretical structures and exploring their logical implications, psychologists have been observing human behavior and measuring human responses. A wedding, it seems, would combine the best of the two." This approach employs question formats originating in the economics, marketing, political science, and recreation literatures.

The results of the study will be submitted as a report to HQUSACE and also as technical reports and *RECNOTES* articles. In addition, it is intended to use the information in presentations at Corps meetings and conferences to assist managers in determining critical criteria that Corps visitors use in making decisions as to where to camp and what amenities they are willing to pay for at those campgrounds.

Fiscal Year (FY) 94

For FY94, the primary tasks are to prepare an analysis of the data collected in the summer of 1993 and from that submit several reports as milestones. In addition, the next phase of the work unit is a survey of potential user's attitudes, motivations, and perceptions concerning fees for outdoor recreation. There is presently no information concerning whether we are providing for the needs of a broad spectrum of our population or meeting the needs of only a small group of users. The information gathered from this survey will provide a base of information from which the Corps can be proactive in addressing this issue.

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[1] Peterson, G. L., and Driver, B. L., ed. (1988). *Amenity resource valuation: Integrating economics with other disciplines.* Venture Publishing Inc., State College, PA.

Regional Recreation Demand Model

by
Jim E. Henderson[1]

The need to incorporate recreation in Corps decisions such as estimating the change in visitation due to operational changes or determining the need for additional recreation facilities has given rise to development of the Regional Recreation Demand Models (RRDM). The concept of RRDM was first introduced by the Water Resources Council in 1983. Basically, a regional model predicts recreation use and benefits based on the variation of resource characteristics and the availability of substitutes (U.S. Water Resources Council 1983). The implementation of recreation-use surveys by most Corps projects has provided the database of visitor origins that allow development of the RRDM.

The concept of a regional demand model is that demand for recreation at a project is a function of demographic characteristics of the users, the natural resource characteristics of reservoirs, and availability of substitutes for the recreation resources at the projects. Because of the differences in camping and day-use patterns, separate models are being developed for camping and day use. Mathematically, the regional demand model is represented as:

Per Capita Day Use or Camping = User Characteristics + Lake Characteristics + Substitutes

RRDM Work Unit

RRDM are being developed for the projects in three Districts: Little Rock, the Arkansas and White Rivers projects; Sacramento, the Central Valley projects; and Nashville, the Cumberland River projects. Model development was initiated during the summer of 1992 after assembling a database of user characteristics, lake characteristics, and substitutes. The modeling effort is being carried out under an interagency agreement with three universities, with a researcher assigned to each of the regions. At this point, initial models are being estimated and refined. Once the work shows how the demand is related to the characteristics as shown above, applications will be undertaken with the models to answer questions about the management or operational questions. The major milestones in the work unit are outlined in Table 1 below.

Table 1
Work Unit Activities by Fiscal Year

FY90	FY91	FY92	FY93	FY94
Annotated Bibliography	Plan of Study	Initiation of Regional Model Development	Applications	User Manual
Plan of Study Meeting	Initiation of Interagency Agreement			

During Fiscal Year (FY) 1993, the developed models for the three regions will be reviewed and evaluated to determine if, for instance, how well the Little Rock model estimates use in the Nashville District. Once the models are acceptable, an effort will be made during FY93 to identify applications of the models.

Model Applications

Once developed, the models provide a tool to use to evaluate the demand for recreation. Possible applications would be to take the models and use them to evaluate recreation in another region. A District could use one of the three developed models, adjusting them based on a careful evaluation of the similarities

[1] U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

and differences between recreation resources and use characteristics of the District where developed and the District applied. One of the regional models could be used to evaluate the recreation use and benefits at a single project in the region it was developed, but for which there were no recreation-use surveys performed. The development of the RRDM is being documented in the user's manual in such a way that a District could use it as guidance for development of a RRDM for a particular region.

Applications could evaluate how recreation use would change in response to changes in demographics or the facilities affected by proposed changes. Potential applications will be determined by the actual variables that are the determinants of demand in the models. That is, the lake characteristics and user characteristics that are shown to be determinants of demand can be used to evaluate the effect on recreation demand that results from changes in the variables.

Accordingly, the RRDM cannot be used to evaluate changes in demand for management or operations questions if the important variable is not included as a variable on the right side of the above generalized equation. For instance, it may be desirable to evaluate the effect of water level changes on recreation. However, if there has not been a variation in historic water levels, there would have been no way to establish the relationship between water levels and visitation; thus, water levels would not be an explanatory variable and would not have been in the model. Similarly, if number of boat ramps or percentage of population over 65 are important from a decision-making standpoint, the RRDM can answer "what if" questions if the necessary decision variables are in the model. Once the models are completed during summer 1993, potential applications can be identified based on the variables in the models and District operations and management decisions under consideration.

Model Development

The data used in model development are the items in Table 2. The most important information about our visitors has been the origin information, i.e., Zip Codes, collected with the recreation-use surveys. Having presented this information earlier, only highlights will be presented here. For the lake characteristics, the facility data, e.g., boat lanes or number of marinas, comes directly from Headquarters, U.S. Army Corps of Engineers (1991). The remaining four items of the lake characteristics are indexes that were developed to represent a component of recreation which may be important to predicting recreation demand.

Table 2
RRDM Data

Lake Characteristics	User Characteristics
Surface acres	Income
Boat lanes	Per capita income
Land base	Unemployment
Campsites	Poverty rate
Picnic tables	Population
Marinas	Total population
Beaches	Percentage over 65 years
Fishing quality	Percentage under 18 years
Water quality	Percentage of ethnic groups
Shoreline development	
Substitute index	

One should note that the fishing quality data used was derived from historic fishery management information. The work being conducted under Dr. Phil Kirk's Reservoir Fisheries work unit was being initiated at the time the RRDM database was being established, so that the data would not be available in time for incorporation in the RRDM. When that data is available, it will be substituted for the fishing quality data in the RRDM data set.

Facility data

Lake recreation areas tend to be developed at greater or lesser levels of development. The point is that all of the facility data is

highly correlated, the higher number of one type of facility, usually the higher number of the rest of the facilities. That is, the more boat lanes or campsites, then generally the more parking spaces, picnic tables, and other facilities there will be. This type of interaction has the effect of making it appear that a single type of facility has a stronger relationship with visitation than actually exists. To address this type of correlation, several statistical methods are being tried.

Further complicating the relation of facilities to visitation is that some projects may have been overbuilt; more facilities were constructed than are or will ever be used. This has the effect that visitation may be only generally related to facilities. The recreation carrying capacity is not being approached, so that the availability of particular facilities does not determine, explain, or correlate with the actual visitation.

Demographic data

The demographic data used in the regional demand models are the county level data from the census, as shown in Table 2. One may recall that it is the Zip Code of the visitor that is collected with the visitation surveys. The reasons for using county level data primarily relate to considerations of modeling. The question has been raised about whether this difference in aggregation level, i.e., Zip Code versus county, could affect the models and the results of using the models. This is discussed later in this paper.

Comparison of Zip Code and County Level Data

As mentioned, the RRDM are being developed using the county averages for the demographic data; however, it was the Zip Codes collected as the origin information in the recreation-use surveys. The question was raised of whether that difference in level of aggregation of data, i.e., Zip Code versus county, could result in differences in the specification of the model. Such differences have been noted in other studies which compared models developed from data at different levels of aggregation, e.g., Zip Code versus county (Clark and Avery 1976).

Concerns over the data aggregation question are based on the possible introduction of error in the models by using a higher or lower level of aggregation than the original data. To address this concern, a single project was used to compare the Zip Code and county level data. The county level data, census data, from the from the RRDM database were compared with Zip Code demographic data acquired from a private vendor. Data were compared in two ways: (a) statistically tested to determine if the statistical properties of the two data sets are similar; the Student's t-test was used for this; and (b) comparison of recreation-use-estimating models developed from the two data sets. The use-estimation models are the first step in a travel costs benefit analysis. The models developed here were strictly for purposes of comparison of Zip Code and county data.

Student's t-test results

The Student's t-test statistically measures how close the two data sets are in terms of their statistical means and the variances, i.e., the range of observed values. In this case, the interest is in whether the statistical properties of the two data sets are different enough to have been sampled from different populations. Those variables which show significant differences between the two data sets should not be considered as possible predictors of recreation demand.

The Statistical Analysis System (SAS) was used to perform the Student's t-test, using PROC TTEST. Results of the analysis showed that there were no differences in the variables: percent black, percentage population over 65 years, percentage population under 18 years, per capita income, and percentage poverty. The analysis indicated that there may be possible differences in the means and variances of percentage Hispanic and unemployment rate.

Based on the limited analysis, there is reason for concern that use of the county rather than the Zip Code data could result in some error being introduced in the use and benefit estimation models. Such concern should be considered on a variable by variable basis.

In noting that there may be some difference in the level of aggregation with the two data sets, one should note that of all the user characteristics being investigated for use in the RRDM, the distance and time data generated from the Zip Code origin are the only data actually collected. The other demographic data are based on census data.

Given the above, it is implicitly assumed that Corps visitors mirror the population at large. That is, the assumption is that visitors to Corps projects exhibit the same age, income, and ethnic characteristics of their Zip Code or county of origin. This assumption is necessary because no systematic data has been collected to describe the demographic characteristics of Corps visitors. There is somewhat anecdotal evidence that visitors to particular projects represent different age, ethnic, or income groups of the population. Such anecdotal information challenges the assumption that Corps visitors mirror the population at large.

Recreation use-estimation models

The regression capabilities of SAS were used to develop per capita day-use models using the Zip Code and the county level data. The models were developed as log-log models, as shown below. Comparison of the two models show some differences. (Variable names: TIME = travel time to project, POP65 = percentage of population over 65 years, BLACK = percentage of black in population, POV = Percentage below poverty line.)

It should be stated that for the purposes of this analysis, i.e., comparison of the two data sets, a rigorous regression analysis was not undertaken. Slightly different versions of the models could have been produced with more rigorous regression techniques. However, the models developed are able to shed some light on the questions posed concerning the Zip Code and county data.

The Zip Code model utilizes the TIME, POP65, and BLACK variables and has an adjusted coefficient of determination (adjusted R^2) of 0.67.

$$\text{Per Capita Day Use}_{(\text{ZipCode})} = -3.05 * \text{TIME}^{-.199} * \text{POP65}^{1.43} * \text{BLACK}^{-0.18} * E$$

The county model utilizes the TIME, POP65, and POV variables and has an adjusted R^2 of 0.66.

$$\text{Per Capita Day Use}_{(\text{County})} = 4.03 * \text{TIME}^{-2.3} * \text{POP65}^{-3.57} * \text{POV}^{1.94} * E$$

Comparison of the models. The larger magnitude of the coefficients on TIME and POP65 is consistent with findings of other comparisons of data aggregation findings. In contrast to other aggregation comparisons, the R^2 for the macrolevel (county) is not larger than the microlevel R^2; in fact, the county level R^2 is slightly lower than the Zip Code.

Of note in comparison of the two equations is the difference in sign on the coefficient for POP65 (positive for the Zip Code and negative for county model) and the difference in the last variable in the model, BLACK in the Zip Code model and POV in the county model. Without further regression analysis, the exact cause of these findings is somewhat speculative.

A potential explanation for the different sign on the POP65 variable may be related to the distribution of the elderly population within a county and the manner in which the visitation, accounted by Zip Codes in the use surveys, is transformed to become the county per capita visitation. Recall that the recreation-use data is collected by Zip Code. The Zip Code model, reflecting a positive relationship between recreation use and percentage of population that is older, could result from Zip Codes with recreation users having a high percentage of retired and elderly. Those Zip Codes for which there were no visitors in a county are

also represented in the county level model. The nonvisitation Zip Codes may, additionally, have a different percentage of persons over 65. This may be found, for instance, in urban areas where a Zip Code may represent an older neighborhood, with larger numbers of retired people. In the county model, the POP65 variable is the county level value, and the county value may be affected by large numbers of nonvisitation Zip Codes with lower numbers of older residents.

The per capita visitation number for the county model is the total visitation from the county divided by the population of the county. The total visitation from the county comes from the visits from those Zip Codes from a county represented in the survey. The population for the county comes from the Zip Codes represented in the survey and also from the nonvisitation Zip Codes, because the population of the nonvisitation Zip Codes must be included to produce a county per capita use measure. The literature on aggregation (Clark and Avery 1976) suggests that this type of effect, in moving to a larger scale (county) of aggregation, causes greater variation in the dependent variable, county per capita day use, than the variation in the POP65 independent variable. This has been shown to result in biased coefficient estimates for the variables. It is suggested that this may have possibly contributed to the different sign on the POP65 variable.

The inclusion of different variables, BLACK in the Zip Code model and POV in the county model, indicates possible interactions between the BLACK, POV, and perhaps the age variables. Work not presented here suggests such an interaction, though the exact nature or mathematical specification was not determined.

Implications of the model comparisons. The most obvious implication is that the Corps should collect data to adequately describe and understand the characteristics and demographics of visitors to Corps projects and to determine the exact recreation use of different user groups within the general population. As indicated, the recreation-use models developed exhibit results both consistent and differing from the results of other data aggregation studies (Clark and Avery 1976). Implications for the RRDM are that the models once developed should be carefully examined in terms of the relationships, the variables included, and the directions, positive or negative, shown by the models. These relationships should be examined in light of any available data on the relationship of the variables to recreation use in general or hopefully at Corps projects.

Summary

The RRDM will provide a valuable tool in answering "What if" questions in response to a range of planning and operations decisions. The three regional models being developed will have the capability of being adapted or applied to other regions and projects. Applications of the models will begin during FY93.

Development of the RRDM to this point has demonstrated a number of things. Working with Districts and their state or other natural resource contacts, a comprehensive database for performing regional modeling can be established. Utilizing some off-the-shelf software to support travel costs analyses and the RRDM documentation, a District could build an RRDM from the ground up or adapt the existing models.

The Corps needs to obtain better information about exactly who our visitors are. The origin information collected with the recreation-use surveys provides the basis for recreation use and benefit evaluations in the RRDM. To respond to questions about changes in population, e.g., aging population, or differences in recreation patterns by different ethnic groups, the Corps needs to have better information on the demographic characteristics of our users.

References

Clark, W. A. V., and Avery, K. (1976). "The effects of data aggregation in statistical analysis," *Geographical Analysis* VIII, 428-438.

Headquarters, U.S. Army Corps of Engineers. (1991). Natural Resource Management System, Washington, DC.

U.S. Water Resources Council. (1983). "Economic and environmental principles and guidelines for water and related land resources implementation studies," U.S. Government Printing Office, Washington, DC.

Effects of Reservoir Operations on Recreational Fisheries—A Status Report

by
Phil Kirk[1]

Introduction

This is a second-year report examining the effects of reservoir operations on recreational fisheries. Angling in Corps of Engineers reservoirs is an important source of recreation (U.S. Fish and Wildlife Service 1989). The Corps of Engineers would benefit by having a better understanding of how water level management (reservoir operations) affects recreational fisheries.

This work unit will produce two major products. The first will be produced using existing predictive tools to evaluate and rank the recreational fishery potential of 46 Corps of Engineers reservoirs. The second product will be a study of reservoir operations and recreational fisheries with a goal of making recommendations on how operational changes can improve fisheries. Figure 1 is a flow diagram outlining the approach to this work unit.

Status of the Work Unit

During 1992-1993, biotic and abiotic information was collected and is being evaluated. The status of the two products associated with this work unit is discussed in the following paragraphs.

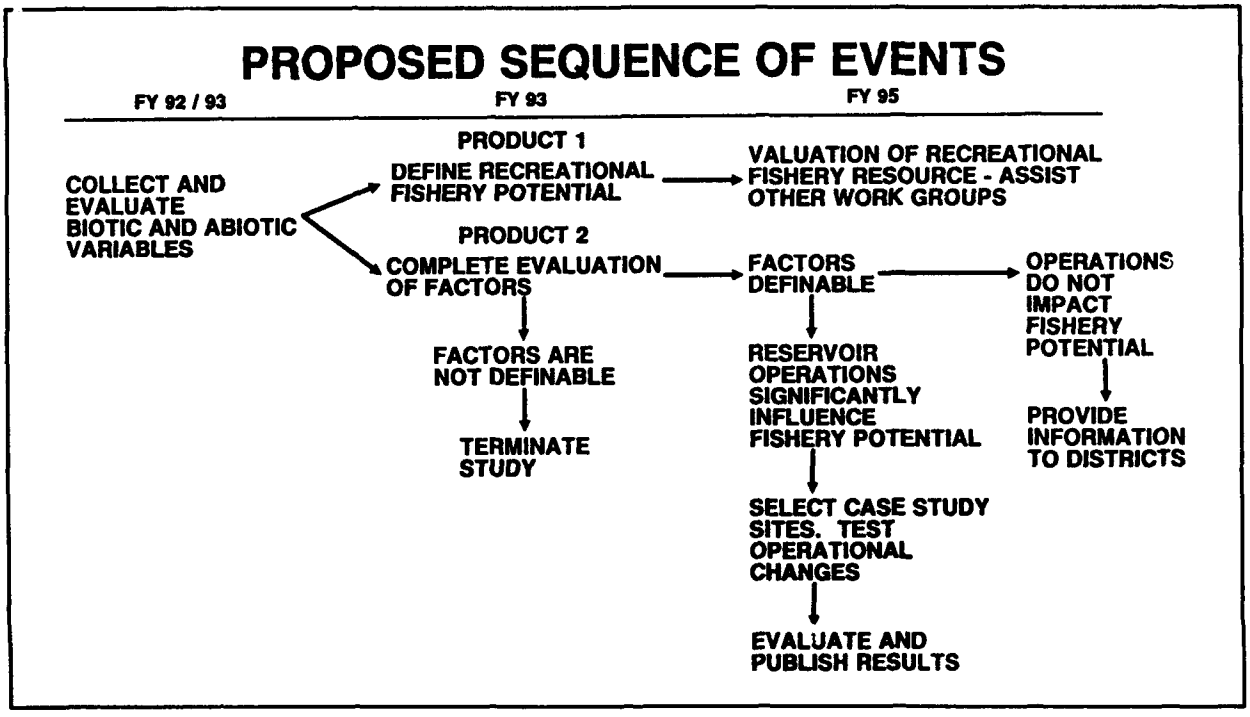

Figure 1. Decision-making process for evaluating costs of operational changes

[1] U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Product 1

This study is designed to provide a second opinion of the recreational fishery potential of 46 Corps of Engineers reservoirs. This evaluation will compliment other models used to define recreational fishery potential. Predictive regression equations (Jenkins and Morais 1971; Ploskey, Aggus, and Nestler 1985; Ploskey et al. 1986) will be used to make estimates of standing crops of fishes, and this information will be used to rank the recreational fisheries potential of the reservoir. Information on physical and chemical attributes needed to use predictive equations has been requested from the Nashville, Little Rock, and Sacramento Districts. This part of the work unit should be completed in late 1993.

Product 2

Existing reservoir databases containing fish standing crop data, biotic, and abiotic variables are being evaluated to rank the attributes most significantly affecting reservoir fisheries (see Table 1). When these attributes have been ranked, they will be linked to reservoir operations to determine how the fishery can be improved. Evaluation using regression and statistical procedures is continuing and should be completed in early 1994.

Any improvements in fisheries caused by operational changes must be demonstrated in case study sites. In fact, this study may be terminated if case study sites cannot be found. Ideally, two case study sites will be chosen; operational changes will be implemented, and fisheries data collected with help of the state wildlife agency. Additional work to determine improvements in recreational opportunities and economic benefits to the surrounding community would improve the study.

Table 1
Biotic and Abiotic Factors Potentially Influencing the Recreational Fishery Potential of Corps of Engineers Reservoirs Managed for Hydropower and Flood Control

Abiotic Factors	
Depth	Outlet depth
Shoreline development	Growing season
Retention time	Reservoir use
Age	Volume
Mean annual fluctuation	Watershed area
Area	Drainage area
Total dissolved solids	Turbidity
Biotic Factors	
Proximity to cities	Harvest
Species richness	Boat access
Angler attitudes	Standing crop

Goals for Next Year

A *RECNOTES* article detailing the recreational fisheries potential of the 46 reservoirs should be drafted this fall and be in print in late 1993. This information will compliment ongoing models to evaluate recreational demand. The next major goal is to finish the evaluation of databases, determine what and where operational changes will improve recreational fisheries, and locate case study sites. Case study sites are a critical consideration since the cooperation of the District and state is needed to change reservoir operations and document the benefits. The goal will be to locate these study sites as soon as possible and begin the collection of baseline information in 1994.

References

Jenkins, R. M., and Morais, D. I. (1971). "Reservoir sportfishing effort and harvest in relation to environmental variables." *Reservoir fisheries and limnology*. G. E. Hall, ed., American Fisheries Society Special Publication Number 8, 359-370.

Ploskey, G. R., Aggus, L. R., Biven, W. M., Jenkins, R. M., and Edsall, T. A. (1986). "Regression equations for predicting fish standing crop, angler use, and sport fish yield for United States reservoirs," Administrative Report 86-5, U.S. Fish and Wildlife Service GLFL.

Ploskey, G. R., Aggus, L. R., and Nestler, J. M. (1985). "Effects of reservoir water levels on year class development and abundance of harvestable fish," Technical Report E-85-5, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

U.S. Fish and Wildlife Service. (1989). "1985 National survey of fishing, hunting, and wildlife-associated recreation," U.S. Department of the Interior, Washington, DC.

An Assessment of Recreation and Natural Resources Managed by the Corps of Engineers

by

R. Scott Jackson[1] *and Chester O. Martin*[1]

Introduction

Natural resources managed by the U.S. Army Corps of Engineers (CE) constitute an important national resource that must meet constantly changing national needs and priorities. Currently, there is insufficient information regarding the status of CE natural resources, the significance of these resources at the national and regional levels, and the ability of existing programs to satisfy changing trends while continuing to meet primary mission objectives.

The objective of the proposed study is to identify and describe the current and future significance of recreation and natural resources managed on CE water resources development projects within the framework of the CE multipurpose mission and in the context of other natural resource providers in the nation.

The information produced in the assessment will provide managers at all levels of the agency regional and national information to do the following:

- Identify the implications of CE management actions.
- Set management priorities which reflect resource demands.
- Identify management actions with the greatest payoff.
- Link natural resource management (NRM) actions with other CE functions.
- Identify opportunities to integrate CE NRM actions with other public and private NRM providers.

Background

Corps Districts and projects are actively involved in many natural resources management programs of national concern. Water-based recreation is a national pastime for a large segment of the public, and CE projects have traditionally been major providers nationwide. However, trends in boating use have changed substantially over the past 20 years, and strategies are needed to make the necessary adjustments to satisfy changing demands. Camping areas and day-use sites are also important facilities at CE projects, and national and regional demographic patterns indicate that modifications in facilities and other amenities will be needed to meet future demands.

Development of multipurpose projects during the decades of the 1940s and 1950s occurred typically in rural settings. At that time, urban sprawl had just begun to affect the American landscape (U.S. Army Corps of Engineers Recreation Task Force 1990). Today, CE projects throughout the nation are becoming increasingly affected by urbanization and rapid land use changes. CE projects provide close-to-home recreation opportunities for many Americans. Recent trends indicate that recreational use of parks close to population centers have increased, while use of remote parks have decreased (Seihl and Szwak 1988). This trend indicates that there will be increasing demands for existing CE natural resources and associated facilities.

CE operational projects have traditionally provided important fishing and hunting lands for the recreating public, and many CE land and water areas are acclaimed regionally and nationally for the quality of resources available

[1] U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

to the sportsman. CE Districts and projects have recently become involved in other natural resource management programs of national significance. These include the North American Waterfowl Management Plan (U.S. fish and Wildlife Service 1986), Watchable Wildlife Program (Vickerman 1991), and Trail Boss program. Projects have also served as demonstration sites for Ducks Unlimited and Quail Unlimited habitat improvement projects and for the CE Wetlands Research Program. Several projects have also made important contributions to national efforts to improve habitat for threatened and endangered species.

The following key questions need to be addressed as an initial step to assessing recreation and natural resources managed by the Corps of Engineers:

- What resources are available at CE projects?
- How are these resources nationally/regionally significant?
- What are the demands for these resources?
- What actions can be taken to improve the availability and quality of significant resources?

The Issue of Significance

Significance is difficult to define, especially for natural resource issues, because it is largely dependent on human values and perceptions, which are highly variable and influenced by a complex of sociological factors. For the purpose of this report, the following criteria will be used to indicate significance:

- Ecological importance/functional value.
- Scarcity/regional degradation.
- Human demand.
- Legal/jurisdictional.

Any natural resource element (species, community, landscape feature) must be regarded as significant if it plays a key role in the function of an ecosystem. For example, the functions of wetlands (e.g., flood storage, sediment control, erosion protection, water quality improvement, food production, fish and wildlife habitat) have been well documented, and wetlands are considered ecologically significant at the national level (Kusler 1983; Hammer 1992; National Research Council 1992). However, certain wetland types may be of greater importance in one region than another (e.g., prairie potholes in the Midwest).

Some CE natural resources are considered nationally or regionally significant because they are either inherently scarce in a region or have been historically depleted or degraded by human activity. Riparian habitat would be an example of a natural resource that is significant due to its scarcity. Riparian zones are considered to be among the most important ecosystems in the Southwest and support approximately 80 percent of the fauna of the region. However, riparian systems presently represent less than 1 percent of all vegetation types in the Southwest. Other natural resources that are limited nationally and regionally include native grasslands, sagebrush communities, and old-growth forests. All threatened and endangered species would fall in this category of significance.

Human demand for a resource should be considered a key determination of significance. Demand may be based on the value of a resource for recreation, aesthetics, economic benefit, or subsistence. For CE projects, recreational demands play a major role in assessing the significance of a resource. Aesthetic values are also important, and subsistence is an issue where CE projects are associated with or contiguous to Native American interests or landholdings. Recreational demands and economic values are highly correlated on CE projects.

Resources that are regulated in any way by public law, treaty, cooperative agreement, or agency regulation must be classified as significant. Examples include wetlands, threatened and endangered species, wild and scenic rivers, and Federal or state designated historic and

Identifying Needs of Nontraditional User Groups at Corps of Engineers Projects

archaeologic sites. Where Federally protected resources occur on CE lands, laws and regulations governing these resources will dictate their protection and use.

Recreation and Natural Resource Trends

In 1989, the U.S. Forest Service published a comprehensive assessment of fish, wildlife, and habitat trends in the United States (Flather and Hoekstra 1989). Recent trends in populations, users, and harvest were derived from a database that was compiled in cooperation with state and Federal wildlife agencies. In some cases, data were available over a long period for certain species, especially for major game species; but in other cases, information was limited geographically and had only been collected over a few years. Harvest and use data were generally more available than were population estimates, and population data were usually more complete for game animals than nongame species. Substantial information was available on some threatened and endangered species and nongame birds because of public concern for preserving these species or for their high nonconsumptive recreational value (Flather and Hoekstra 1989).

An assessment of national trends in outdoor recreation supply and demand was also published by the U.S. Forest service in 1989 (Cordell et al. 1990). The supply of public and private recreation resources was developed from national inventory data. Trends in recreation demand were developed based on national recreation participation surveys and population projections. Supply and demand information were compared to estimate future needs for various categories of recreational opportunities. The results of this work was used to recommend opportunities to improve the availability of recreation and wilderness resources managed by the U.S. Forest Service.

Although data presented in the Forest Service studies did not include Corps operational projects (except possibly for some lands leased to state agencies), it can be assumed that national and regional trends presented in the reports would be generally true for other Federal lands as well, especially in respect to user demand. The information below is summarized primarily from Flather and Hoekstra (1989), Cordell et al. (1990), and other recent studies that address specific resources.

National Supply of Fish, Wildlife, and Recreation Resources

Available information on the current status and historical trends in fish and wildlife resources is biased heavily towards featured species that are of commercial importance or taken for sport (Flather and Hoekstra 1989). Recent concern over the status of nongame species, especially migratory birds, has resulted in efforts to conduct large-scale inventories. However, the results of these inventories, conducted only in recent years, have not conclusively established long-term trends. In respect to species and populations, the following general trends have been determined from a national perspective:

- Big game (increase).
- Small game (stable to decreasing).
- Furbearers (stable to increasing).
- Waterfowl (decrease).
- Migratory songbirds (decrease).
- Raptors (highly variable; some species decreasing).
- Fishes (increase for hatchery-raised sport fish; stable to decreasing for others).

The trends noted above indicate only general trends for broad categories of species, and it must be realized that there are numerous exceptions, especially at the regional level. Populations of big game species have increased in all regions of the country except for deer (*Cervus* spp.) in the Pacific Coast region. The white-tailed deer (*C. virginianus*), the most widely hunted big game species, presently has a national population 47 times larger than at the turn of the century (Downing 1987). The wild turkey (*Meleagris gallopavo*), considered

here as a big game species, has been successfully reintroduced in many regions and has experienced population increases throughout the country. State agencies expect populations to remain stable or increase somewhat for all species.

Populations of small game species associated with agricultural lands have experienced serious declines over the last 20 years, and current data indicate that this trend will continue (Flather and Hoekstra 1989). Factors implicated in various studies include clean farming practices; removal of hedgerows, fencerows, and other woody vegetation bordering fields; decline of early successional stage vegetation; increased herbicide use; restricted use of prescribed burning; and introductions of exotic plant species that outcompete native grasses. Populations of ring-necked pheasant (*Phasianus colchicus*) and prairie grouse species have declined due to agricultural practices that have reduced critical food and cover. The South's populations of bobwhite and eastern cottontail (*S. floridanus*) have recently declined by 50 and 35 percent, respectively (Flather and Hoekstra 1989).

According to Forest Service records, populations of most small game species that inhabit forests appear stable or have shown an upward trend. Gray squirrel (*Sciurus carolinensis*) and fox squirrel (*S. niger*) populations have increased in both the North and South, but numbers have decreased in the Midwest due to the removal of farm woodlots. Available data showed that populations of forest grouse species remained stable or increased slightly from 1965 to 1985 (Flather and Hoekstra 1989). However, this is subject to considerable regional variation. For example, data obtained from Quantico Marine Base, VA, showed that the resident ruffed grouse (*Bonasa umbellus*) population began to steadily decline in the 1970s, remained relatively stable through 1983, and crashed to zero in 1988.[1]

Population trends have been variable for furbearers. Based on trapping records, the most commonly harvested species appear to have stable or increasing populations (Flather and Hoekstra 1989). However, the low market price for the pelts of most species has resulted in decreased harvest in recent years. Beaver (*Castor canadensis*) populations in the eastern states have increased significantly in recent years resulting from extensive translocations (in the 1950s and 1960s), harvest regulations, and reduced trapping due to low fur price. Species such as the river otter (*Lutra canadensis*), mink (*Mustela vison*), and red fox (*Vulpes vulpes*) have shown declines in some regions. A program to translocate river otters was initiated in the 1980s, and successful results have been indicated in some areas.

Waterfowl populations have decreased significantly nationwide, especially for species of dabbling ducks. Surveys conducted in the late 1980s estimated the fall migratory population to be 66 million ducks, compared to fall flights of 100 million ducks recorded during the 1970s (U.S. Fish and Wildlife Service 1986). The decline in waterfowl populations is a serious national problem, and most Federal land management agencies (in cooperation with state agencies, conservation organizations, and private interest groups) have pledged cooperation to implement programs in an effort to reverse this trend. Although most waterfowl populations have experienced serious declines, the giant Canada goose (*Branta canadensis gigantea*) has been successfully reintroduced at lakes and reservoirs throughout the country.

Nongame bird surveys indicate that 64 percent of breeding bird populations in the United States have remained stable, with greater declines noted in the East than in the West. However, long-term observations show that the populations of many species of birds that nest in North America and winter in Mexico, the Caribbean, and Central and South America are declining; these species are often referred

[1] Personal Communication, 1988, Tim Stamps, U.S. Marine Corps Base, Quantico, VA.

to as "neotropical migrants." Surveys indicate that populations of 71 percent of the species classified as neotropical migrants declined between 1978 and 1987. Of the 44 species showing negative trends, 20 represented statistically significant declines. Two primary factors have been suggested to explain recent declines in neotropical species: (a) fragmentation of breeding/nesting habitat in the United States and Canada, and (b) loss of wintering habitat through extensive deforestation and land conversion in neotropical regions (National Fish and Wildlife Foundation 1990).

The plight of certain raptor populations, especially the bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion halietus*), and peregrine falcon (*Falco peregrinus*), during the 1960s and 1970s provided a focal point for environmental programs and resulted in regulations and intensive management that brought about the significant recovery of several species (Flather and Hoekstra 1989). Several species have shown stable to increased status in recent years, but others have suffered from the conversion of brushlands and rangeland habitats to row-crop agriculture, urban development, and losses of wetlands and old-growth forests.

Fish populations in the nation's waterways are rarely inventoried except at specific locations. Although many population surveys have been conducted, it is generally not possible to extrapolate the data beyond the specific area sampled (Flather and Hoekstra 1989). However, several studies have associated negative impacts on the nation's fishery resources with human development and habitat degradation (Behnke and Zarn 1976; Karr, Toth, and Dudley 1985; Phinney 1986). Coldwater fishes, especially anadromous salmonids, have especially declined in the western states and parts of the Northeast. Warmwater fish communities have also deteriorated significantly in agricultural landscapes of the Midwest.

Fish and wildlife resources are essentially products of land cover (e.g., vegetation present) and how the land is used (Flather and Hoekstra 1989). Nationwide, the acreage of both forest and rangeland decreased by approximately 5 percent from the early 1960s to the mid-1980s. Land area devoted to crop production decreased slightly through the mid-1970s but showed a 3-percent increase by the early 1980s. Wetlands account for only 5 percent of the total land area in the contiguous United States; although regulated by Federal law, the total wetland area has declined significantly over the past several decades (Flather and Hoekstra 1989). Conversely, urban lands were estimated to increase by 88 percent from 1960 to 1980 (Frey 1983). Urban expansion in the vicinity of Federal lands is of particular concern because urbanization has both direct (habitat removal) and indirect (increased human-related disturbance) impacts on fish and wildlife resources.

CE natural resources provide recreational opportunities for millions of Americans. What makes CE projects particularly valuable as recreational resources is the proximity of those resources to the American people. Most CE projects are located within 50 miles (80.47 km) of a major population center. This results in significant recreational use on a limited resource base. The Corps of Engineers supplies 30 percent of the recreational opportunities provided by Federal agencies on 1.5 percent of the over 690 million acres[1] in the Federal estate available for recreation. Most (80 percent) of these opportunities are provided in the Eastern United States where 80 percent of the United States population resides (Task Force on Outdoor Recreation Opportunities 1986).

Recreational use in the United States is projected to significantly increase in the next 50 years as the population increases. The supply of recreation opportunities adjacent to population centers will not keep pace with demand for many recreational activities (Cordell et al. 1990). This situation has raised concerns on the part of CE managers about maintaining quality recreation opportunities on intensively

[1] To convert acres to square miles, multiply by 4,046.873.

used recreation sites. This concern will affect management of recreational access to CE lands and waters through lakeshore management plans and marina feasibility studies, operational management plans, and master plans.

Land and waters managed under the jurisdiction of Federal agencies, including the Corps of Engineers, are usually managed for multiple uses such as commercial navigation, timber production, range forage, wildlife habitat, and watershed protection (Seihl and Szwak 1988). Increases in fishing and other water-based recreation have experienced increases in participation in the past 10 years. This raises the question "How will projected increases in demand for water-based recreation and other competing water uses be served by declining flows?" The Corps of Engineers has been a leader in timing reservoir releases to meet the needs of recreational water users. For example, special reservoir releases from Francis Walter Dam, built primarily for flood control on the Lehigh River in northeastern Pennsylvania, are made for 12 to 18 hr on weekends to create white-water rafting opportunities (Guldin 1989).

Water requirements for recreation are also being more fully incorporated into the management of large river basins. The recent effect of drought conditions in the Midwest and resulting scarcity of water in the Missouri River basin had a significant impact on the availability of water for navigation, hydroelectric production, and other project purposes. Recent significant increases in recreational use and resulting economic development of the Missouri River system prompted the CE to fully incorporate recreational water requirements into the review and update of the Missouri River Master Water Control Manual (U.S. Army Corps of Engineers 1992). Similar water management studies in the Columbia River System and the Apalachicola-Chattahoochee-Flint/Alabama-Coosa-Tallapoosa River Basins are fully considering recreation requirements. The results of these efforts may be a more stable supply of water-based recreation opportunities to meet future demand.

National Demand for Fish, Wildlife, and Recreational Resources

Information on national and regional demand for natural resources was summarized primarily from data presented in Flather and Hoekstra (1989). For fish and wildlife, demand analysis was interpreted to involve projections of resource use (Hoekstra and Hof 1985). This modification to the traditional economic analysis framework was considered necessary because true demand analysis requires a conventional market structure that usually does not exist for fish and wildlife. For recreation use, standard national surveys addressing fish and wildlife related resources have been conducted (U.S. Fish and Wildlife Service and USDC Bureau of Census 1982; U.S. Fish and Wildlife Service 1989). These data were used by Flather and Hoekstra (1989) to examine the correlation between participation levels in recreation activities and socioeconomic factors presumed to be important in explaining why people choose to participate in certain recreation activities.

Existing national and regional surveys indicate that natural resource participation patterns have recently changed. They generally show declining numbers of hunters (except for migratory bird hunting), increasing numbers of anglers, and greater participation in nonconsumptive natural resource activities (Flather and Hoekstra 1989). This trend is verified by other surveys and regional studies (Shaw and Mangun 1984; Brown et al. 1987; Hammitt, Dulin, and Well 1993). National and regional trends are discussed for the following commercial and recreational uses:

- Recreational hunting (decrease).
- Public hunting areas (increase).
- Fur trapping (decrease).
- Nonconsumptive wildlife use (increase).
- Recreational fishing (increase).

The number of hunters participating in both big game and small game hunting has shown a decline nationwide, and this trend is expected to continue (Flather and Hoekstra 1989). However, hunting demand is highly variable regionally and depends largely on the type of game sought. The number of user days devoted to big game hunting on Forest Service lands has been increasing nationwide, due in part to increases in deer and turkey populations. The number of big game hunters has generally increased during the last 20 years, but at a declining rate. Small game hunting pressure showed a steady increase from the 1970s to the early 1980s, followed by a notable decline. A decline in the number of small game and migratory bird hunters is likely due to several factors, including lower game populations, reduced access, and crowded hunting conditions.

Waterfowl hunting has decreased nationally, but the magnitude of the decline varies greatly by region. The downward trend is likely a function of many interacting factors including declining waterfowl populations, increased harvest regulations, and changes in recreational preferences (Flather and Hoekstra 1989). In a recent survey of duck hunters in New York, Enck, Swift, and Decker (1993) reported the following reasons given for declining interest in duck hunting by licensed sportsmen: too busy due to other priorities, low waterfowl populations, confusing regulations, lack of a place to hunt, crowded hunting conditions, increasing costs, short season length, and dislike of steel shot.

Fewer than one-third of all hunters used public lands in 1980 (U.S. Fish and Wildlife Service and USDC Bureau of Census 1982), which indicated the importance of private lands to the recreational hunter. Wiggers and Rootes (1987) reported that lease-hunting resulted in more private land opened for hunting in 12 of 16 state surveys, and financial incentives may encourage more private landowners to make their lands available for hunting (Flather and Hoekstra 1989). However, limited access is beginning to constrain the opportunity to hunt on private lands, and inflated costs may restrict fee hunting to higher income brackets in some regions. Therefore, an increase in demand for high-quality public hunting areas is expected in the future.

The number of trappers has recently declined nationwide. This is apparently due largely to declining fur prices, but may also be affected by public attitudes and legislative pressure to restrict trapping activity. The declining populations of some species, such as mink and river otter, has also reduced trapping pressure. Based on the current market and consumer demand, the downward trend in trapping is predicted to continue (Flather and Hoekstra 1989).

Nonconsumptive natural resource uses, such as recreational wildlife viewing and photography, have increased at a substantially greater rate than consumptive uses. Surveys indicate that public lands are critical to nonconsumptive fish and wildlife recreation, and they are becoming increasingly more important. In 1980, 75 percent of the nonconsumptive users participated in activities on public lands; the total increased to 86 percent in 1985. Most of the increase was associated with state-owned lands, while participation declined slightly on Federal lands except for the South. Nevertheless, participation in nonconsumptive activities is expected to increase substantially in the next 50 years (Flather and Hoekstra 1989).

Recreational fishing demand has shown an increase nationwide over the past 20 years, but the trend varies by type of fishing. Freshwater fishing represented 86 percent of the total number of anglers in 1985; the number of saltwater anglers has recently increased following a decline in 1980. Coldwater fishing demand has increased by 150 percent in recent years, and this trend is expected to continue. Models that project demand in expected levels of use indicate that coldwater fishing will double over the next 50 years. Warmwater fishing is also expected to increase, but at a slower rate than coldwater fishing (Flather and Hoekstra 1989).

Boating is a major recreational activity at CE projects with 27 percent of nonsightseeing visitors to CE projects engaging in boating activities in 1991 (U.S. Army Corps of Engineers 1991). Participation in boating has increased significantly in the past 20 years. During that period, the number of recreational boats owned by Americans increased from 9.6 million in 1973 to over 19 million in 1989. The rate of boat ownership almost doubled during that period from 46 boats per 1,000 Americans in 1973 to over 78 boats per 1,000 Americans in 1989 (American Red Cross 1991). The 1982-83 National Recreation Survey reported 28 percent of all Americans participate in some type of boating activity (Cordell et al. 1990).

Conclusions

The preceding discussion of trends in the supply and demand for natural resources is intended to demonstrate that national requirements served by the Corps of Engineers natural resource management program have changed over the years and will continue to change in the future. Continued urbanization adjacent to CE projects, population shifts, changes in demographics, and rapidly evolving institutional relationships will continue to place new demands on the program. While in many instances the agency has a record of effectively responding to changes, a comprehensive assessment of regional and national natural resource requirements would aid in developing national program priorities and communicate a rationale for priorities developed. Monitoring regional and national trends over time will improve the ability of the agency to anticipate future natural resource requirements and proactively develop programs to meet future needs.

References

American Red Cross. (1991). "National boating survey," U.S. Department of Transportation, United States Coast Guard, Washington, DC.

Behnke, R. J., and Zarn, M. (1976). "Biology and management of threatened and endangered western trouts," U.S. Department of Agriculture Forest Service General Technical Report RM-78.

Brown, T. L., Decker, D. J., Purdy, K. G, and Mattfeld, G. F. (1987). "The future of hunting in New York." *Transactions of the North American Wildlife and Natural Resources Conference*. 52, 553-566.

Cordell, H. K., Bergstrom, J. C., Hartmann, L. A., English, D. B. K. (1990). "An analysis of the outdoor recreation and wilderness situation in the United States: 1989-2040," U.S. Department of Agriculture Forest Service General Technical Report RM-189.

Downing, R. L. (1987). "Success story: White-tailed deer." *Restoring America's wildlife. 1937-1987.* H. Kallman, ed., U.S. Department of Interior Fish and Wildlife Service, Washington, DC, 45-47.

Enck, J. W., Swift, B. L., and Decker, D. J. (1993). "Reasons for decline in duck hunting: Insights from New York," Wildlife Society Bulletin 21(1), 10-21.

Flather, C. H., and Hoekstra, T. W. (1989). "An analysis of the wildlife and fish situation in the United States: 1989-2040," U.S. Department of Agriculture Forest Service General Technical Report RM-178.

Frey, H. T. (1983). "Expansion of urban area in the United States: 1960-1980," U.S. Department of Agriculture, Economic Research Service, Natural Resource Economics Division.

Guldin, R. W. (1989). Analysis of the Water Situation in the United States: 1989-2040. U.S. Department of Agriculture Forest Service General Technical Document RM-177.

Hammer, D. A. (1992). *Creating freshwater wetlands*. Lewis, Publ., Chelsa, MI.

Hammitt, W. E., Dulin, J. N., and Well, G. R. (1993). "Determinants of quality wildlife viewing in Great Smoky Mountains National Park," *Wildlife Society Bulletin* 21(1), 21-30.

Hoekstra, T. W., and Hof, J. G. (1985). "National assessments of wildlife and fish: A technical framework," U.S. Department of Agriculture Forest Service General Technical Report RM-122.

Karr, J. R., Toth, L. A., and Dudley, D. R. (1985). "Fish communities of Midwestern rivers: A history of degradation," *BioScience* 35, 90-95.

Kusler, J. A. (1983). "Our national wetland heritage: A protection guidebook," Environmental Law Institute, Washington, DC.

National Fish and Wildlife Foundation. (1990). *Neotropical migratory bird conservation program.* National Fish and Wildlife Foundation, Washington, DC.

National Research Council. (1992). "Restoration of aquatic ecosystems: Science, technology, and public policy," National Academy Press, Washington, DC.

Phinney, L. A. (1986). "Chinook salmon of the Columbia River basin." *Audubon Wildlife Report 1986.* R. L. DiSilvestro, ed., Academic Press, New York, 715-741.

Seihl, G. A., and Szwak, L. B. (1988). "Report on outdoor recreation demand: An overview," Presidents Commission on Americans Outdoors, Demand Committee Working Papers, Washington, DC.

Shaw, W. W., and Mangun, W. R. (1984). "Nonconsumptive use of wildlife in the United States," U.S. Department of the Interior Fish and Wildlife Service Resource Publication 154, Washington, DC.

Task Force on Outdoor Recreation Resources and Opportunities. (1986). "Outdoor recreation in a nation of communities, action plan for Americans outdoors," U.S. Government Printing Office, Washington DC.

U.S. Army Corps of Engineers. (1990). "U.S. Army Corps of Engineers recreation study," Headquarters, USACE, Washington, DC.

_____. (1991). Natural Resource Management System, Washington, DC.

_____. (1992). "Missouri River master water control manual, review and update," Missouri River Division, Omaha, NE.

U.S. Fish and Wildlife Service. (1986). *North American Waterfowl Management Plan.* Department of the Interior, Washington, DC.

_____. (1989). "1985 National survey of fishing, hunting, and wildlife-associated recreation," Department of the Interior, Washington, DC.

U.S. Fish and Wildlife Service, and USDC Bureau of Census. (1982). "1980 National survey of fishing, hunting, and wildlife-associated recreation," U.S. Government Printing Office, Washington, DC.

Vickerman, S. (1991). "Watchable wildlife: A national initiative," Defenders of Wildlife, Portland, OR.

Wiggers, E. P., and Rootes, W. A. (1987). "Lease hunting: Views of the nation's wildlife agencies." *Transactions of the North American Wildlife and Natural Resources Conference.* 52, 525-529.

Techniques for Non-Federal Participation in Corps Recreation and Natural Resources Management

by
H. Roger Hamilton[1]

Background

Most Corps of Engineers water resources development projects were formulated, planned, and constructed for conventional purposes including navigation, hydropower production, municipal and industrial water supply, and flood control. However, outdoor recreation and fish and wildlife have become very important congressionally authorized purposes as the American society has become increasingly affluent and demographic changes have occurred across our landscape.

The Corps is currently the second largest provider of outdoor recreation opportunities in the country. The use of limited resources for this purpose is very intense. Corps lakes provide over 30 percent of the total recreation use that occurs on Federal lands on less than 2 percent of the total Federal land base that is available for this purpose (National Park Service 1988, 1989).

The Office of Management and Budget (1990) reports that the Corps spends only 9 percent of the total Federal funds expended for recreational resources ($164 million out of a total Federal $1.82 billion in 1989).

Recreation and natural resources management responsibilities at Corps lakes are achieved through partnership arrangements. Although some success has been achieved in this arena, non-Federal participation has not met expectations of Department of the Army and Corps of Engineers leadership.

Policy Background

1944 Flood Control Act

State and local partnerships have been entered into throughout the nation under authority of Section 4 of the Flood Control Act of 1944. Until about the mid-1970s, approximately one dollar of non-Federal public and one dollar of private investment was received for each dollar of Federal investment at Corps lakes. The 1944 act declared that recreation and fish and wildlife were authorized purposes and provided for issuance of leases and licenses to non-Federal agencies for those purposes.

Fitt Program

By memorandum dated 18 November 1966, Mr. Alfred Fitt, Special Assistant to the Secretary of the Army (Civil Functions), requested General Walter P. Leber, Director of Civil Works, to develop a specific plan to encourage local authorities to assume recreation management responsibilities.

The plan resulted in expansion of the Code 710 Program (Development of Recreation Facilities at Completed Projects) to create the Code 712 Program. A 5-year program consisting of $38 million was initiated in 1969 with the intent of relieving the Corps of responsibility for this function.

In order for a state or local agency to participate in the Fitt Program, they had to produce a letter of intent to assume operation and

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maintenance of recreation areas after agreed upon development at full Federal cost. Letters of intent were received from 19 state and local agencies to take over 68 parks at 32 projects. Over 90 percent of the development was requested by agencies in eight states. Thirty-seven percent was requested by one state, Mississippi (Hamilton 1981).

The Fitt Program was terminated in 1976 after several potential partners declined assumption of operation and maintenance jurisdiction when Corps development was complete and several others turned back areas after only a short period of operation.

Public Law (PL)

The Federal Water Project Recreation Act (PL 89-72) was enacted on 9 July 1965. The significant requirements of the act are as follows.

- Full consideration is to be given to recreation and fish and wildlife enhancement as equal project purposes with other purposes.
- Planning relative to development of recreation potential is to be coordinated with existing and planned Federal, state, and local public recreation developments.
- Non-Federal public agencies must agree to provide not less than 50 percent of the recreation development costs and assume all operation, maintenance, and replacement responsibilities.
- Provisions of the act are applicable only to projects authorized after its passage.

Amendments

Two amendments to Public Law 89-72 have been enacted:

- The Water Resources Development Act of 1974 (PL 93-251) changed the cost-sharing formula for fish and wildlife enhancement to 75 percent Federal and 25 percent local.
- Title XXVIII, Section 2804 of the Reclamation Projects Authorization and Adjustments Act of 1992 changed the non-Federal requirement to assume 100 percent of operation, maintenance, and replacement to "...not less than one-half the costs."

Administration application of law

During the hearings on Public Law 89-72, Mr. Elmer B. Staats, Deputy Director of the Bureau of the Budget (now the Office of Management and Budget), testified before the Committee on Interior and Insular Affairs of the U.S. Senate as follows (Staats 1965):

> "I might add at this point that we recognize that it is difficult to initiate a change in policy or procedure. Accordingly, some differences are to be expected between projects already authorized and those not yet authorized. We do not intend to retroactively apply the cost-sharing policies of S. 1229 to projects that have been authorized on some other basis."

Also, Congressman Saylor of Pennsylvania testified in response to a question from Representative Duncan of Oregon:

> "That is true: the gentleman is correct. This cannot affect any projects already authorized and constructed or authorized and yet to be constructed."

Mr. Saylor further stated in response to Mr. Nelson:

> "It would apply to newly authorized projects."

Nothing in the language of the act or in its legislative history suggests intent to make the cost-sharing provisions of Public Law retroactive. Yet, on 5 August 1965 an agreement between the Bureau of the Budget (now OMB) and the Corps made the policy retroactive to projects authorized prior to the passage of PL 89-72.

Status

Leaders of the Corps and the Army have repeatedly reinforced the posture of the Executive Branch relative to increased non-Federal participation in the program. However, efforts to increase local participation with the Corps have met with limited success. Intuitively, several potential reasons for this situation can be identified.

- Both Federal and non-Federal agencies are faced with limited funding and other priorities that must be tended to with limited resources.
- Federal design standards for facilities are generally more expensive than those of local agencies.
- Action in processing contracts is very slow permitting policy amendments and priority changes in the Federal and non-Federal sectors during the negotiation and processing phases.
- A lack of equity among Federal agencies relative to cost-sharing requirements exists, and local agencies can sometimes "shop around."

Study Approach

Three important components exist in the procedures for attracting and retaining non-Federal participation in recreation resources development and management. First, national policy relative to this matter is set forth in public laws. Next, the Executive Branch of government sets forth rules and regulations that prescribe procedures for implementation of the law. This can take many forms including executive orders, Code of Federal Regulations, and agency regulations (in the case of the Corps, Engineer Regulations).

The first two legs on this three-legged stool deal with policy and are not within the purview of this research proposal. The third component is comprised of the techniques that are applied at all levels of the organization to implement the policy directives from the Congress and the Administration. This is where the focus of this work unit lies.

Pertinent legislative and administrative requirements will be identified and used as a basis for describing application of policy throughout the agency. A survey will be conducted at District, Division, and Headquarters levels of the Corps to determine aspects of recreation cost-sharing that have been successful and unsuccessful. The survey will be directed toward both actual and potential cost-sharing arrangements and will also include information gathering from state and local agencies that have become partners and who declined to cost-share with the Corps.

Other functions and purposes of the Corps multiple purpose projects will be examined relative to non-Federal participation in order to form a basis for recommending consistent management strategies within the agency.

In several cases, state and local agencies have entered into agreements and have subsequently returned the recreation areas to the Corps for operation, maintenance, and replacement of facilities. Data will be gathered regarding the extent of that situation, reasons for the turn-backs, and geographic and demographic factors in an effort to determine what, if anything, is common to this issue.

Benefits

The recently formed committee to address recreation research strategy identified non-Federal participation as one of the issue areas that they intend to address. The issue has been discussed, debated, and implemented with a variety of strategies over the past three decades.

Although cost-sharing requirements prevail and success has been limited, little or nothing has been done to determine what mechanisms are successful in realizing full potential of the policy. This work will result in improved techniques for attracting and retaining successful non-Federal cost-sharing partners at Corps projects.

References

Hamilton, H. R. (1981). "Non-Federal participation in recreation-resource management at Corps of Engineers water resources development projects," U.S. Army Corps of Engineers, Fort Belvoir, VA.

National Park Service. (1988). *Visitation index - 1987*. Department of the Interior, National Park Service, Washington, DC .

_____. (1989). *Federal recreation fee report - 1988*. Department of the Interior, National Park Service, Washington, DC.

Office of Management and Budget. (1990). *Budget of the United States government fiscal year 1991*. Government Printing Office, Washington, DC.

Staats, E. B. (1965). State before the Committee on Interior and Insular Affairs of the U.S. Senate on S. 1229, "Federal Water Project Recreation Act," 23 March 1965.

An Assessment of Fisheries Needs for Corps of Engineers Reservoirs

by
Phil Kirk[1]

Introduction

Warmwater reservoirs are managed by the Corps of Engineers for a variety of uses; i.e., hydropower, flood control, navigation, recreation, or a combination of these. Sport fishing in these reservoirs provides recreation for millions of anglers and contributes much to the local economies (U.S. Fish and Wildlife Service 1989). Operation of these reservoirs affects fish populations and thus angling. Although the responsibility for assessing and managing fish populations rests with state wildlife agencies, operation of the reservoirs causes the Corps of Engineers to share responsibility for fisheries. Realizing this responsibility, the Corps of Engineers has sponsored fisheries investigations through direct allotted programs, reimbursable studies, and by directly funding universities or state wildlife agencies.

These fisheries studies have traditionally answered questions of local interest. As a result, such ad hoc efforts often had limited application to the Corps of Engineers as a whole. In times of constrained funding, it is important to recognize common problems and identify the most important areas requiring investigation.

Goals of This Work Unit

This work unit will achieve three major goals. The first goal is to identify fisheries problems in Corps of Engineers reservoirs. The next goal is to evaluate the importance of each problem area to the Corps of Engineers. The last goal is to rank the problem areas and recommend studies that will provide answers to these problems.

Approach

This work unit is scheduled for three years. During the first year, a survey will be prepared and sent to both project managers and state wildlife agencies requesting information on reservoir fisheries problems. The survey will be analyzed and the results summarized. Each problem area will be evaluated to determine important gaps in scientific knowledge and where new technologies need to be developed to resolve fisheries problems.

During the second year, the survey will be summarized, and a workshop of project managers will be held to evaluate the problem areas identified in the survey. Managers will be asked to rank the problem areas and recommend fisheries investigations.

During the third year, and based on the survey and workshop, a final report will be written. This report will summarize the fisheries problems, identify the need for fisheries investigations and the development of new technologies, and make recommendations for future fisheries research that will provide the greatest benefit for the Corps of Engineers.

Benefits of This Work Unit

It is important to identify the most pressing fisheries needs facing project managers on a systematic basis. To most, efficiently used constrained research funds, significant fisheries problems, and important gaps in scientific information must be identified. By prioritizing the direction of future fisheries investigations, the most important problems can be addressed first,

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marginal problems postponed, and funding for fisheries investigations used more efficiently.

Summary

Management of Corps of Engineers reservoirs has created fisheries problems that require scientific investigation. In the past, investigations were not funded on a prioritized, systematic basis and usually produced results of only local benefit. A new direction is needed for fisheries investigation based on producing the greatest benefit to the Corps of Engineers. This work unit will identify the most significant fisheries needs and make recommendations on the direction of future fisheries investigations.

References

U.S. Fish and Wildlife Service. (1989). "1985 National survey of fishing, hunting, and wildlife-associated recreation," U.S. Department of the Interior, Washington, DC.

Identifying Needs of Nontraditional User Groups at Corps of Engineers Projects

by

Christopher M. White,[1] *Paul R. Nickens,*[1] *and John Titre*[1]

Introduction

Current demographic trends indicate Asians, African-Americans, Hispanics, Native Americans, the elderly, and the disabled comprise an increasing percentage of the population in the United States. Presently, the Corps of Engineers has little or no data concerning the recreational needs, access issues, interests, and concerns of a potentially large segment of the national population that is comprised by members of these groups.

Research is being proposed to identify and evaluate the recreational and other needs of these nontraditional users, especially those that include the following three groups: ethnic minorities (e.g., Asians, African-Americans, or Hispanics); Native Americans; and the disabled. Originally, separate research work units were proposed to identify the recreational and access needs associated with these three groups. However, due to similarity in the problem areas and overlap in addressing the pertinent issues, this research has been combined into one work unit designed to address an integrated work unit under the more general designation "nontraditional users."

The following paragraphs briefly outline the individual problem areas, the objectives of the research, and the proposed efforts that will be used to provide Corps managers the necessary background and guidelines to deal with these issues in upcoming years.

Discussion

The needs of nontraditional users of Corps projects and recreation areas can be subdivided into three categories. For the purposes of this discussion, these are (a) ethnicity and changing demographics, (b) Native American access to natural and cultural sites, and (c) water-based recreation access for individuals with disabilities. Each of these issues is briefly discussed below.

Ethnicity and changing demographics

Demographic trends indicate an increasing percentage of ethnic minorities as part of the United States population by the turn of the century. For instance, areas of the Southwest will, by the year 2000, have a majority Hispanic population. Presently, there is very little other than anecdotal information concerning the recreation needs of these ethnic groups. One concern is that the recreation needs of these ethnic populations are not being met or only partially addressed by Federal land-managing agencies. The result of not addressing those needs would be a drop in recreation visitation or a shifting of usage at Corps projects and a shift of funding for recreation to those agencies or organizations that are meeting the recreation needs of these groups.

As an example, the U.S. Forest Service is currently funding several studies of ethnicity and recreation use and needs. One study recently completed for the Forest Service by Texas A&M University examined whether Hispanic populations in the Southwestern states were looking for different facilities and recreation experiences in National Forests. Several other studies funded by the Forest Service's Forestry Sciences Laboratory in Chicago have examined the recreation uses of National Forests by ethnic groups in California

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and around the Chicago area. To date, no comparable studies have been conducted by the Corps of Engineers.

Native American access issues

Interactions between all Federal agencies, including the Corps of Engineers, and Native American Indian tribes have increased in recent years because of recognition of treaty rights, passage of laws such as the American Indian Religious Freedom Act and the Native American Graves and Repatriation Act, and a general increase in legitimate demands by Native Americans. Much of this interest focuses on access to traditional and sacred sites that may today be on Federal lands. These sites include such things as burial grounds and graves, plant or animal collecting places, mythic or legendary sites, and the like.

Several agencies are presently developing guidelines for such interactions, which are sure to multiply with time. The Corps of Engineers Civil Works Districts/projects do not have existing guidance on consultation procedures for granting access to culturally important natural and sacred sites at Corps projects, nor is the extent of the problem well defined.

Water-based recreation access for the disabled

As the nation's largest Federal provider of water-based recreation opportunities, access to boat ramps, marinas, and fishing piers is not provided equally at Corps of Engineer projects. Access is difficult for many disabled participants for reasons of physical, hearing, and sight loss. Taking this difficulty into account, and to meet the standards required by the recent American Disabilities Act, Corps managers need the means to improve access for these persons. Since most managers may be unaware of the special requirements of disabled participants, there is a need to create an awareness of disabled participant preferences prior to implementing changes in facility development.

Water-based recreation has been addressed on a small scale by several agencies, including the Corps. However, most of this information is fragmented and difficult for the average project manager to obtain. Acquiring this information will allow managers to create an accessible environment for the greater enjoyment of all Americans. These efforts will likely enhance the Corps public image and overall goodwill among other agencies.

Objectives

The objectives for the proposed research effort are listed as follows:

- To characterize the current demographic trends of the Corps of Engineers by the following:
  - * Comparing participation of present user groups with general population proportions.
  - * Identifying recreation and access needs and preferences of nontraditional users.
  - * Comparing recreation needs and preferences between different nontraditional user groups.
  - * Providing guidelines to assist in allocation of limited monetary resources in the most efficient manner for operation and maintenance of recreational facilities that best meet the needs of identified groups.
- To provide better definition and evaluation of the issues relating to Native American traditional and sacred sites that occur on Corps lands, to develop written guidance for Corps managers to use when dealing with these matters, and to increase the level of awareness of the issues among Corps personnel.
- To determine disabled participants' preferences and specialized access requirements, to identify management techniques that will help guide rehabilitation efforts

for greater disabled participant accessibility, and to create a framework for evaluating selected options to improve accessibility as identified by a facilities/customer segment matrix.

Research Approaches

To meet the above needs and objectives, several research steps are being proposed. After preparation of a study plan, the work unit will be conducted in three phases. First, an initial study will gather information about existing or ongoing studies by other agencies that could apply to the Corps needs. A workshop will be held to gather input from representative Corps personnel to identify major field research concerns and needs, as well as potential study sites. If feasible, a partnership with other Federal, state, and local agencies will be developed to allow for additional comparison and contrast and to contain costs.

Second, using focus groups, nominal group techniques, and surveys, data will be collected concerning recreation and other access needs and preferences of both users and nonusers of recreation facilities and other resources at Corps projects.

Finally, analysis and evaluation of this information will be presented in technical notes, guidelines, reports, and video training programs to highlight study findings and suggestions developed from the study for dealing with the recreation and access needs and preferences of Corps customers and potential customers.

Conclusions

A comprehensive understanding of the recreation and other needs and preferences of different user groups will allow managers to better respond to and deal with the demands of nontraditional users of Corps lands. Completion of the study outlined above will permit better decisions on improvements to recreation facilities, new recreation facilities, the need for and type of visitor information programs, and improved criteria for setting funding priorities for different types of recreation facilities.

Summary—Breakout Session, Field Review Group and District Points of Contact

by
E. Paul Peloquin[1]

The session was facilitated by E. Paul Peloquin, North Pacific Division, and recorded by John Tyger, also of the North Pacific Division. The U.S. Army Engineer Waterways Experiment Station (WES) staff was not present during the breakout session. Dr. Andy Anderson as a recently retired WES representative was permitted to remain and participate in the discussion.

Current Concerns

The general feelings of the group were that many of the administrative and procedural matters brought before the Field Review Group (FRG) are never resolved. Many of the same problems discussed in any given year keep reappearing in subsequent years and never go away.

There is much frustration with the proponent system, obtaining research results from other groups, and getting our own problems into those programs when applicable. The FRG only meets once a year at some selected location to conduct its "in-progress review." The feelings of the audience are the "group" is becoming short term in its thinking and not "communicating" with the originators of the proposed research in the field or laboratory or even talking to the other FRG members. Some topics such as natural resources, separate and apart of recreation, are probably underrepresented as "Work Units." The FRG is not seeing to it that our field, the projects, are informed of the disposition or reception of their suggestions. Simply stated—the FRG is not accountable for what it does or does not do. The FRG cannot become a rubber stamp for any of the players (laboratories or Headquarters, U.S. Army Corps of Engineers (HQUSACE)) involved with the conduct of research within the Natural Resources Research Program (NRRP).

The FRG and the District Points of Contact (POC) feel the FRG must become more visible in its conduct of business and informing its customers—the projects. The first step is for the Technical Monitor of the Natural Resources Research Program to convene another meeting of the FRG this fiscal year to discuss the following:

- The FRG's vested interest and representation on other research groups such as aquatic plant control, environmental impacts, fisheries, planning methodology, remote sensing, water quality and wetlands, among others.
- The FRG's frequency of review and the who, what, when, where, why, and how that review is to be conducted. Included in the items of concern are the FRG's ability to reorganize work units, reprogram work unit dollars, and ensure the complete review of all work units by seeing that all work units are presented by WES scientists before the FRG votes.
- The FRG's ability to facilitate the field as true proponents of research before the FRG and assisting those interests (District POCs and proponents) with preparation as work units by the WES scientists.
- The FRG assigning an FRG member, District POC, Project person, or another a role as an ad hoc member to the work unit administered and managed by WES.

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The FRG appreciates the current information presented on a Division by Division basis for the Natural Resources Technical Support (NRTS), but is making a request now for more information. The FRG unequivocally requested of WES and HQUSACE the results by District and subject for the cost reimbursable work conducted by WES in the Natural Resources arena. The FRG also wants in addition to the NRTS presentation for each Division, the District name and subjects covered through the NRTS Program. The subjects and costs for these services could be an important management topic in evaluating the total NRRP, while providing direction for the conduct of future research by WES.

Discussion of Proposed Work Units

An Assessment of Recreation and Natural Resources Managed by the Corps of Engineers (CE) (375-3)

The breakout session participants agreed the work identified in the unit should be done. The participants also appeared to agree that as a natural resources work unit, this was an excellent submittal. A consensus seems to exist within the group that a study such as this was a first step. Likewise, there was a feeling within the group that a need exists to get the word out. But a series of questions were generated as a result of the discussion.

Is this work unit a laboratory or library research project? Could the work unit be completed by a university under contract to WES? Is this an analysis of policy and, hence, the work should be accomplished through the Institute of Water Resources or HQUSACE? Can the dollar amount for the proposed work unit be reduced?

In general, there was a concern that the work unit as written was too broad and overlapped with other work units. The group had the feeling that much of the information identified to be a product of this study already existed in other arenas including sister agencies. The group seemed to feel the proposal should be narrower in subject content with a greater emphasis on national and regional issues.

Techniques for Non-Federal Participation in CE Recreation and Natural Resources Management (375-4)

This work unit was given a very low priority by the participants in the breakout session. The reasons were many, but essentially reflected the feelings of the field that the topic encourages bad policy. The consensus of opinion from the audience was that in actuality there is no money or national priority for the Field Operating Activities to pursue this topic at this time. One suggestion was made that the proposal could be rewritten to see why the existing program does not work.

An Assessment of Fisheries Research Needs for CE (375-6)

This work unit was also given a very low priority by the participants. The two reasons offered were that the work was essentially the data acquisition phase of making a research proposal and that the Work Unit 32797 already covers some or most of this unit. Here in Portland, OR, where the meeting was held, the Endangered Species Act and the endangered and threatened status attached to some of its salmonids will direct the regional program in an institutional fashion much more than any management practice generated through a generic research package. The appearance of this proposal before the FRG was thought to be indicative of the problem with the manner in which the FRG conducts its business.

Identifying Nontraditional CE Project User Groups (375-8)

The topic of a nontraditional CE user was well received by the breakout audience, but stimulated both discussion and debate. The strongest support for the proposal seemed to center around the development of the work unit as a tool or methodology to assist the

park manager. The feelings of the group were that the CE does not need additional design criteria. The CE needs to know and understand the demographic and cultural diversity of its user and become sensitive to that diversity in the development of the physical configuration for its facilities and the management of its visitors. The discussion intensified with a part of the audience saying the handicapped should be omitted from this study, and the other side saying they should be included. The audience was reminded that Federal Law already exists for accessibility issues, and the U.S. Forest Service is leading and agency-wide review of design criteria for the physically handicapped. But in considering the total, a consensus seems to exist that many people of different nationalities with or without infirmities bring to our projects cultural influences and needs. Much of what we identify as cultural diversity, we do not understand. The group recognized the need of the CE to develop the topic into a form that can be used to design and redesign our facilities and programs to ensure the customer an enjoyable experience in a safe environment.

Development of a Procedure for Measuring the Economic Impact of Dispersed Use at CE Projects (375-1)

Ms. Kathleen Perales was invited to the breakout session for a special presentation of this work unit. Based upon the 29-30 April 1992 minutes and its inclusion as a possible future work unit, the breakout session audience wanted clarification on the research status of this particular proposal. Ms. Perales graciously complied and then left the session. This work unit was well received by the group. Beyond the work unit, however, was the realization by the group that the FRG has problems in approving work and then managing its affairs to some satisfactory end.

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13. ABSTRACT *(Maximum 200 words)*

The 18th Annual Meeting of the U.S. Army Corps of Engineers Natural Resources Research Program was held in Portland, OR, on 29-30 April 1993 to review current research activities, discuss future research, and afford the opportunity for presentation of operational needs. Papers presented at the meeting are included in this report.

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